The Adoption of Data Mining Technology within Accounting Information Systems in Publicly Listed Companies in Jordan

By

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Declaration

This work contains no material which has been accepted for the award of any other degree or diploma in any university or other institution, and to the best of my knowledge, this thesis contains no material previously published or written by another person, except where due reference is made in the text of this thesis.

20th November 2013

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Signature of Candidate Date

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ENDORSEMENT

20th November 2013

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Asal Al-Odat Date

Dedication

I dedicate this thesis to my family, my wife Sofia, my beloved child Awsam and for my coming baby -By God well- for their constant support and unconditional love.

I love you all dearly.

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In the name of God, the Most Gracious, the Most Merciful. All praise be to Allah, the Creator and Master of the Universe.

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My parents had to grudgingly learn to accept my separation from them and still gave me nothing but support, day after day, my love and gratitude for them can hardly be expressed in words.

I would like to thank my loved ones, my sister Enas and my two brothers Anas and Eyas, who have supported me throughout the entire process, both by keeping me harmonious and helping me to put pieces of this puzzle together. I will be grateful forever for your love.

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List of Acronyms and Abbreviations

IT	Information Technology
AIS	Accounting Information System
DM	Data Mining
KDD	Knowledge Discovery in Databases
AMS	American Mathematical Society
CIS	Cooperative Information Systems
AI	Artificial Intelligence
ERP	Enterprise Resource Planning
TAM	Technology Acceptance Model
ICT	Information and Communication Technology
NMS	New Management Styles
TRI	Technology Readiness Index
ASE	Amman Stock Exchange
DMRI	Data Mining Readiness Index
FA	Factor Analysis
KMO	Kaiser-Meyer-Olkin
MIS	Management Information Systems
BW	Business Warehouse

Abstract

The successful adoption of information technology (IT) and data mining (DM) requires a clear understanding of the organisational context within which technology operates, including both human and technological dimensions. The objective of this research is to investigate the implementation of and the readiness to adopt IT and DM technology within the accounting information system (AIS) in publicly listed companies in a developing nation, specifically Jordan. The relationship between managerial styles prevailing in Jordanian publicly listed companies and the managers' attitudes towards IT and DM are explored. In addition, relationships between certain demographic characteristics including gender, age, organisational experience, educational level, and span of control and managers' attitudes towards DM are explored. Furthermore, this research investigates issues that influence Jordanian publicly listed companies to adopt/not adopt DM technology, such as technological, organisational and human resource issues. Finally this research explores the relationship if any between awareness of DM technology and the intention to adopt these technology. The sample for this research was randomly drawn from a list of the publicly listed Jordanian companies. Surveys were sent to lower and middle line managers of publicly listed companies, and a small sample was then interviewed to enrich the data. Analysis of quantitative data was undertaken using SPSS. The analysis using SPSS confirmed the existence of two dimensions in Jordanian publicly listed companies, people-centred and task-centred management. Factor analysis indicated that the two dominant management styles were people and task orientated styles. Further analysis indicated that the people-centred management style has a significant positive relationship with the attitudes of managers and DM. On the other hand, the task-centred management style and demographic characteristics were found to have no statistically significant relationship with the attitudes of managers towards DM. The results also revealed that the majority of respondents indicated readiness toward accepting DM technology and that they are ready to use it. For both the existing adopters of DM technologies and non-adopters issues such as technological, organisational and human resources were significant and

had played a role in the decision to, or not to utilise such technology. Finally, this research found that the awareness about DM has no statistical significant relationship with the intention to adopt DM tools. Considering the scarcity of previous literature in the research's particular context (Jordan) and its broader context (Arab and developing countries), this research will provide an original contribution concerning the effect and appropriateness of management styles and attitudes towards IT and DM on the use of modern computer technology within the context of publicly listed companies in developing countries.

1 Introduction

1.1 Background

Advances in information technology (IT) across the past two decades have been significant (Venkatesh *et al.* 2012). These advances have enabled more efficient processing of information, including accounting and business information, through the use of IT. Of particular interest in this research study is the development of the concept of Data Mining 'DM' as a means to extract speedily and effectively information stored within the accounting information systems (AIS).

This thesis investigates IT and DM adoption within the AIS in publicly listed companies in Jordan from an organisational management point of view. This research argues that there is pressure on organisations to utilise IT and DM tools within their AIS. Success should be based on a clear understanding of the adoption process, including human and technological dimensions. In particular, the investigation of the internal organisational context and organisational management can enhance the establishment of successful IT and DM adoption strategy through incorporation of organisational context with IT and DM adoption strategy. As a part of this understanding, this research considers management styles within a technologically developing Arab country context, Jordan, and provides some empirical and theoretical insights towards understanding the changing and diversifying nature of management styles. In addition, this research explores managers' attitudes towards IT and DM and the relationship between certain demographic characteristics, including age, gender, educational level, organisational experience and span of control and the managers' attitudes towards IT and DM. This enables the recognition of the overall relationship between management styles and attitudes towards IT and DM.

1.2 Research problem and objectives

Information technology (IT) refers to technology in general; it can be both tangible and intangible which facilitates the acquisition, processing, storing, delivery and sharing of information and other digital content (Venkatesh *et al.* 2003). Information systems are systems which people in organisations use in gathering, processing, storing and disseminating information (Kwon & Vogt 2010). The accounting information system (AIS) can be defined as a system that operate functions of data gathering, processing, categorising and reporting financial events with the aim of providing relevant information for the purpose of score keeping, attention directing and decision-making (Reece & Gable 1982), Kaplan *et al.*, (1998) perceived the AIS as retaining and generating the information used by the organisation to plan, evaluate and diagnose the dynamics of operations and financial circumstances. Data mining (DM) is defined as identifying valid, novel, potentially useful, and ultimately understandable patterns in data (Schutt 1996); DM is the automated process of going through large amounts of data with the intention to discover useful information about the data that is not obvious. Useful information may include special relationships amongst data, specific models in which data repeats itself, specific patterns of data, and ways of classifying data or discovering specific values that fall out of the normal pattern or model.

The building blocks of DM techniques date back to the 1950s when the work of mathematicians, logicians and computer scientists combined to create artificial intelligence (AI) and machine learning (Buchanan 2005). By the start of the 1990s, the term Knowledge Discovery in Databases (KDD) had been coined and the first KDD workshop held (Fayyad *et al.* 1996).

From a theoretical stand point, several frameworks have been put forth for identifying the reasons corporations choose to adopt or not adopt DM techniques and to identify their status in implementing such technologies (Nemati & Barko 2003; Su-Chao Chang *et al.* 2003; Wah & Bakar 2003). For example the approaches for applying DM in an organisational setting focus mainly on variables which play a role in the adoption

decision for DM technology, such as organisational size, culture, strategy and technological factors (Su-Chao Chang *et al.* 2003; Wah & Bakar 2003). Despite these advances in understanding, there has thus far been very little examination from either a theoretical or practical perspective about the adoption of IT and DM within the AIS in publicly listed companies in developing nations.

A preliminary review of the literature has revealed few examples of research addressing the effect of IT and DM in AIS strategies; those that were identified were written from a variety of perspectives with little commonality in approach or findings. Consequently, a need was identified for research providing a common conceptual framework for IT and DM adoption in publicly listed companies in developing nations and for research evaluating the relationship between DM and AIS outcomes.

In brief, it appears that little literature has discussed the impact of IT and DM on AIS, although there has been some in the public sector, see (Abd Rahman 2008). In addition, few investigations and theoretical insights have been provided in the literature about the interaction between IT and DM and the AIS within the context of developing nations. There are few guidelines on what is needed and what problems may arise in order to adopt this technology.

The aim in this research is to investigate the implementation of and the readiness to adopt IT and DM technology within AIS in publicly listed companies in a developing nation, specifically Jordan. The relationship between managerial styles prevailing in Jordanian publicly listed companies and the managers' attitudes towards IT and DM will be investigated in this research. The International Monetary Fund (IMF) (2008) and American Mathematical Society (AMS) (2008) classified Jordan as a developing nation. It has an economic infrastructure that includes multinational organisations and banking organisations, therefore, there is likely to be some understanding of the usefulness and some adoption of IT and DM technology. Furthermore, in terms of the researcher being Jordanian will improve the researcher's ability to investigate this context and interpret the likely situation with respect to the investigated research questions.

This research will focus on accounting and auditing managers and IT personnel within accounting and audit departments. These stakeholders were chosen as the target respondents as it is believed they would represent the major AIS stakeholders within a publicly listed company. Further they could be expected to have a sound understanding of the information issues within the company because they act as primary players in utilising this technology, seeking to use this information to the best advantage for the company. Also any related fields to this research such as IT and organisational management will be considered.

The central research problem, addressed in this study is:

There is a lack of knowledge regarding the adoption of information technology and data mining within accounting information systems in publicly listed companies in developing nations from an organisational management point of view.

In order to explore the research problem, the focus of the study is directed to two main research objectives.

1. To determine whether management in publicly listed companies in Jordan have an understanding of the concept of DM and to what degree they are willing to use or are using it.
2. To determine factors that impact on the implementation of IT and DM within the AIS of publicly listed companies in Jordan.

To enable the achievement of these objectives, the following research questions were developed based on previous studies about the adoption of IT and DM and critical review of the available literature.

1. What management styles dominate publicly listed companies in Jordan?
2. Is there a significant relationship between managers' attitudes towards IT and DM and their styles of management?

3. Are there significant differences between male and female managers regarding their attitudes towards IT and DM?
4. Is age influential in the attitudes of managers towards IT and DM?
5. Is the length of work experience influential in the attitudes of managers towards IT and DM?
6. Is there any significant relationship between the manager's level of education and his/her attitude towards IT and DM?
7. Is there any significant relationship between the manager's span of control and his/her attitudes towards IT and DM?

1.3 Justification and motivation for this research

Most of the IT and DM research addresses the implementation and development of IT and DM and applications that focus on data quality, marketing, forecasting, communication, health care management, software integration, prediction of failure and hypermedia (Liao 2003). Only a few studies have sought to address the implementation of IT and DM within accounting, finance or auditing. James & Andy (2004) discussed the DM issues that should be considered by internal auditors in small and large organisations. Other studies describe the use of data in analysing an organisation's financial reports, and the use of data to forecast exchange time series process (Kim *et al.* 2004; Kloptchenko *et al.* 2004).

Studies in developing countries have tended to focus on the impact of cultural and social beliefs on the implementation of IT. For example, Davis (1993) argued that social and cultural beliefs are key issues to IT in the Arab world. Carnoy (1997) argued that a lack of highly skilled management and a flexible, self-confident labour force are considerable barriers to the diffusion of new technology in developing countries. Abdul-Gader & Alangari (1996) stated that human resources issues are the most important barriers towards IT assimilation in Saudi public organisations. According to (Abdul-Gader & Alangari 1996, p. 113):

> *The richness of IT literature has primarily focused on organisations in the developed hemisphere. Even in the sporadic literature on IT in developing countries, one rarely encounters scholarly reports on IT assimilation problems in these countries' organisations. Most studies are descriptive in nature.*

DM technology is relatively new and has not been extensively investigated by researchers in the developing-country contexts. This study seeks to expand the body of knowledge about DM in developing countries such as Jordan and to redress this gap in the literature by providing insights into the adoption and implementation of IT and DM techniques within the AIS and to identify a suitable model for the implementation of DM in publicly listed companies in developing nations. In brief, this research is likely to help senior management in accounting and audit departments and the IT personnel within these departments in publicly listed companies, to obtain a better understanding of the issues of implementation and use of IT and DM technology within the area of the AIS. In addition, these contributions are expected to benefit both researchers and practitioners. Researchers can benefit by applying the conceptual model developed in this research study in the conduct of similar research in organisational settings other than the publicly listed companies sector and in the conduct of research extending the model and investigating different aspects of the model in more specific strategic contexts. Practitioners can benefit by applying the results of the analysis to their own AIS quality data decisions, with an understanding of how those decisions relate to the organisation's strategic outcomes.

Another motivation for this research is derived from a gap in knowledge identified in a previous research study (Abd Rahman 2008) which investigated the utilisation of DM technology within the AIS in the Malaysian public sector. Abd Rahman (2008) undertook a country study of the adoption of DM technology and recommended further investigation of this area was needed.

> *The first recommendation would be a replication of this study in different settings which might ..... provide interesting insights into national comparisons and international practices. Research on cross-country and cross-culture*

comparisons of the level of readiness, the model utilised, and the impact of such utilisation on decision making (Abd Rahman 2008, p.173).

1.4 The thesis context

A review of the literature associated with IT and DM adoption within the AIS indicates a focus on the use of technology a main driving force, and a force which drives the process of change within organisations. The utilisation of the current organisational setting to support this change and interactions between organisational components including management and the use of DM within AIS has received little attention in previous literature. This motivated the researcher to investigate the existing organisational management setting and its association with IT and DM adoption within AIS. Investigation of the interaction between management styles and managers' attitudes towards adoption of IT and DM within AIS in publicly listed companies in Jordan provided a mechanism to achieve this end. In this way this thesis extends the work completed by Abd Rahman (2008).

1.5 Research approach and methodology

This study undertook a review of literature that addresses DM related concepts, implementation, development and effectiveness. The related literature which addresses the problems with implementation of IT and DM in developing countries was considered, such as social and cultural beliefs, language problems, lack of knowledge, lack of financing, lack of planning, and lack of infrastructure. Both quantitative and qualitative approaches was adopted. A survey was undertaken because of the nature of this research and the unclear status of the adoption of IT and DM, personal interviews and questionnaires are appropriate methods of data collection. An advantage of these methods is that they enable the researcher to interact directly with participants to gain a richer understanding of the context and problem.

1.5.1 Data analysis

The data generated by quantitative approach was analysed using SPSS v.16, qualitative interviews were subsequently utilised to enrich the survey data and explore a number of issues raised by the survey responses for quantitative data. Within SPSS, a series of analyses such as Cronbach alpha, individual t-tests, Correlations, Factor Analysis, Kaiser-Meyer-Olkin, Barlett's Test of Sphericity, Bivariate analysis and Mann-Whitney U Test were conducted.

1.6 Outline of the thesis

The structure of the thesis follows:

Chapter 2 is a review of the literature that is relevant to this research. Chapter 3 presents the management styles. Chapter 4 presents the attitude towards IT and DM from management point of view. Chapter 5 presents the research methodology and design. Chapter 6 presents a synthesis of the quantitative findings and discussion. Chapter 7 presents the data analysis and hypothesis testing and Chapter 8 summarises the results and contribution of this research as well as the implications for theory and practice.

2 Literature review

2.1 Introduction

This study explores the adoption of IT and DM within the AISs in publicly listed companies in a developing country - Jordan. In particular in this chapter, literature relating to the AIS, DM, the interaction between IT and the organisational components of IT - structure, process and management are critically evaluated. IT and DM adoption models are reviewed and critically evaluated to identify the important themes to assist in the identification of an appropriate model for application in a developing country such as Jordan.

2.2 Accounting information system and data mining background

This section explores the accounting information system, the idea of 'quality data' within this system, and the link to information technology and data mining in accessing this data.

2.2.1 Accounting information system

AIS is part of IT (Figure 2.1). It focuses on the recording, classification, summarising and validating of data about business financial transactions. These functions are performed for the various groups within the organisation that are concerned about the respective decisions associated with financial accounting, managerial accounting and tax compliance issues (Hollander *et al.* 1999; Leech *et al.* 2005). The need to integrate these often diverse systems led to the accountant's appreciation of shared data-bases that provide a cohesive picture of the organisation's data, eliminating duplications and reducing data conflicts (Moscove *et al.* 1996).

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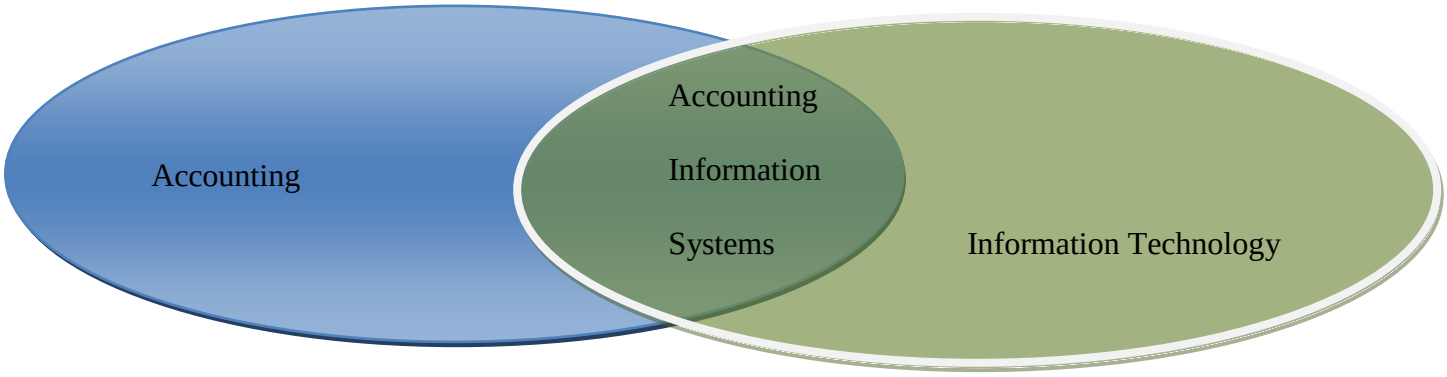
Figure 2.1: AIS: At the Intersection of Accounting and IT



An accounting information system (AIS) records and processes accounting transactions within functional modules such as, accounts payable, accounts receivable, payroll and trial balances. Caillouet & Lapeyre (1992) viewed the Accounting Information System as providing financial data for managerial functions such as planning, controlling, providing performance reports of the variances and special reports to analyse problem areas. Similarly, Kaplan *et al.* (1998) perceived the AIS as retaining and generating the information used by the organisation to plan, evaluate and diagnose the dynamics of operations and financial circumstances. The AIS is a major source of information to decision makers in business organisations and for not-for-profit organisations (Caillouet & Lapeyre 1992; Murthy & Wiggins Jr 1999). The major role of the AIS is the processing of financial transactions (Siegel 2007). For example, Hall (2011) described the AIS as comprising four major sub-systems. These are: the fixed asset system, which processes transactions pertaining to the acquisition, maintenance and disposal of fixed assets; the general ledger/financial reporting system, which produces the traditional financial statements, such as income statements, balance sheets, statements of cash flows, tax returns and other reports required by law; the transaction processing system, which supports daily business operations with numerous documents and messages for users throughout the organisation; and the management reporting system, which

provides internal management with special purpose financial reports and information needed for decision making, such as budgets, variance reports and responsibility reports.

In particular, AISs are used to maintain and produce the data used by organisations to plan, evaluate and diagnose the dynamics of operations and financial circumstances (Anthony 1994). Providing and assuring quality data is an objective of accounting, therefore, it is increasingly important to develop powerful means for analysis and interpretation of such data and for extraction of information that could help in decision making.

2.2.2 Accounting information systems data quality

Several authors define the quality of data as "fitness for use", i.e., the ability of a data collection to meet users' requirements (Orr 1998; Wang *et al.* 1998). Furthermore, a set of comprehensive essential dimensions of data quality for delivering high quality data has been determined as follows:

Table 2.1: Data quality dimensions. Adopted from Strong (1997)

Dimensions	Definitions
Accessibility	The extent to which data is available, or easily and quickly retrievable
Appropriate amount of data	The extent to which the volume of data is appropriate for the task at hand
Believability	The extent to which data is regarded as true and credible
Completeness	The extent to which data is not missing and is of sufficient breadth and depth for the task at hand
Concise representation	The extent to which data is compactly represented
Consistent representation	The extent to which data is presented in the same format
Ease of Manipulation	The extent to which data is easy to manipulate and apply to different tasks
Free-of-Error	The extent to which data is correct and reliable

Dimensions	Definitions
Interpretability	The extent to which data is correct and reliable
Objectivity	The extent to which data is unbiased, unprejudiced and impartial
Relevancy	The extent to which data is applicable and helpful for the task at hand

Data quality in the AIS has been addressed in several studies. One of the early attempts to measure data quality in AIS was a statistical approach to measure errors in outputs of internal control systems (Yu & Neter 1973). Cushing (1974) developed a mathematical model of the accounting internal control system and measures of reliability and cost. Researchers subsequently moved on to address data quality as it relates to audit populations (Johnson *et al.* 1981; Groomer & Murthy 1989). Some AIS research focused on analysing cost/quality control for information systems (Ballou & Pazer 1985; Ballou *et al.* 1987). Other researchers developed a model to provide management with a quantitative measure for determining the quality of data in information systems (Paradice & Fuerst 1991).

In business contexts where each organisation can access internal data, the primary goal of AIS data quality assurance is the continuous control of data values and, possibly, their improvement. In cooperative information systems (CIS), involving multiple organisations that must share data to reach a common goal, AIS quality assurance requires objective measures and evaluations of data quality that can be exchanged along with corresponding data. In addition, in a context in which interacting organisations may not be familiar with each other, approaches to guarantee the quality of exchanged AIS data have to achieve high benefits from the organisations' interactions. One can argue that the adoption of DM within the AIS system will help in achieving quality data from the AIS system, quality data may include special relations between the data, specific models that the data repeat, specific patterns and ways of categorising them or discovering specific values that fall out of the "normal" model. It also provides possibilities to explore data from the AIS in new ways with the use of artificial intelligence techniques and neural networks.

2.2.3 Data Mining

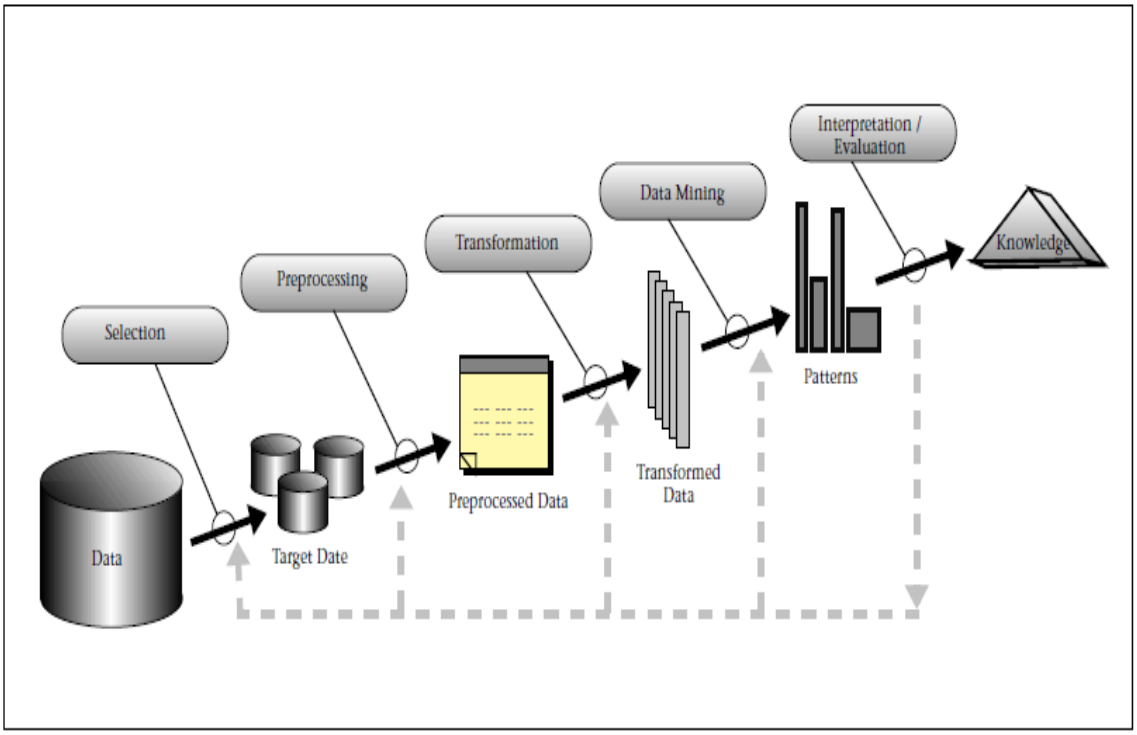
In accessing the data available within an AIS data mining is a technique which has been explored. This has become necessary with rapid progress in digital data acquisition which has led to a significant growth in the amount of data stored in databases, data warehouses, and other kinds of data repositories (Zhou 2003). Although valuable information may be hiding behind the data, the overwhelming data volume makes it difficult for human beings to extract this without powerful tools. In order to lessen such a data rich but information poor problem a new discipline named DM emerged during the late 1980s. DM describes the process of extracting knowledge from huge volumes of data, with the help of the computer (Witten & Frank 2002).

2.2.4 Defining data mining

Vast amount of data have accumulated within computer systems with the development of technology and the decision by business to adopt computer databases as the place for recording and keeping data. Additionally growth in business size and reporting requirements adds to the amount of data firms must record and therefore accumulate. This has resulted in the need to develop a new generation of computational theories and tools to assist people in extracting useful information from the growing volumes of digital data. These theories and tools are reflected in the emerging field of knowledge discovery in databases. Knowledge discovery in databases is the intersection of research fields such as machine learning, pattern recognition, databases, statistics, artificial intelligence (AI), knowledge acquisition for expert systems, data visualisation and high-performance computing (Fayyad *et al.* 1996).

DM is a step in the KDD (Figure 2.2) process that consists of applying data analysis and discovery algorithms that, under acceptable computational efficiency limitations, produce a particular enumeration of patterns (or models) over the data (Fayyad *et al.* 1996).

Figure 2.2: An overview of steps in KDD process, Fayyad *et al* 1996b: p41



DM covers a range of techniques for the efficient discovery of this valuable, non-obvious information from such large collections of data. DM has been described in various ways but is essentially concerned with the analysis of data and the use of software techniques to find patterns and regularities in datasets (Fayyad *et al.* 1996). The concept of data mining is known as the process of discovering new, valuable information from a large collection of raw data (Fayyad *et al.* 1996; Brabazon 1997; Firestone 1997) and should enable better decision making throughout an organisation (Fong *et al.* 2002; Nemati & Barko 2003; Berry & Linoff 2004; Wen 2004). The process of exploration and analysis of large quantities of data in order to discover meaningful patterns and rules from large amounts of data (Fong *et al.* 2002; Nemati & Barko 2003; Berry & Linoff 2004) and the process of discovering useful knowledge from large amounts of data stored either in databases, data warehouses or other information repositories. Simply stated, DM refers to extracting or "mining" knowledge from large amounts of data (Han & Kamber 2006).

2.2.5 How does data mining work?

Generally DM is an iterative and interactive process involving several steps.

1- Problem identification and definition

The first step is to understand the application domain and to formulate the problem. This step is clearly a prerequisite for extracting useful knowledge and for choosing appropriate DM methods in the third step according to the application target and the nature of data.

2- Obtaining and pre-processing data

The second step is to collect and pre-process the data. Today's real-world databases are highly susceptible to noisy, missing and inconsistent data due to their typically huge size (often several gigabytes or more) and their likely origin from multiple, heterogeneous sources. Low quality data will lead to low quality mining results. Data pre-processing is an essential step for knowledge discovery and DM. Data pre-processing includes the data integration, removal of noise or outliers, the treatment of missing data, data transformation and reduction of data, etc. This step usually takes the most time needed for the whole KDD process.

3- Data mining / Knowledge discovery in databases

The third step is DM that extracts patterns and/or models hidden in data. This is an essential process where intelligent methods are applied in order to extract data patterns.

4- Result Interpretation and Evaluation

The fourth step is to interpret (post-process) discovered knowledge, especially the interpretation in terms of description and prediction which are the two primary goals of discovery systems in practice. Experiments show that

discovered patterns or models from data are not always of interest or direct use and the KDD process is necessarily iterative with the judgment of discovered knowledge. One standard way to evaluate induced rules is to divide the data into two sets, training on the first set and testing on the second. One can repeat this process a number of times with different splits and then average the results to estimate the rules performance.

5- Using Discovered Knowledge

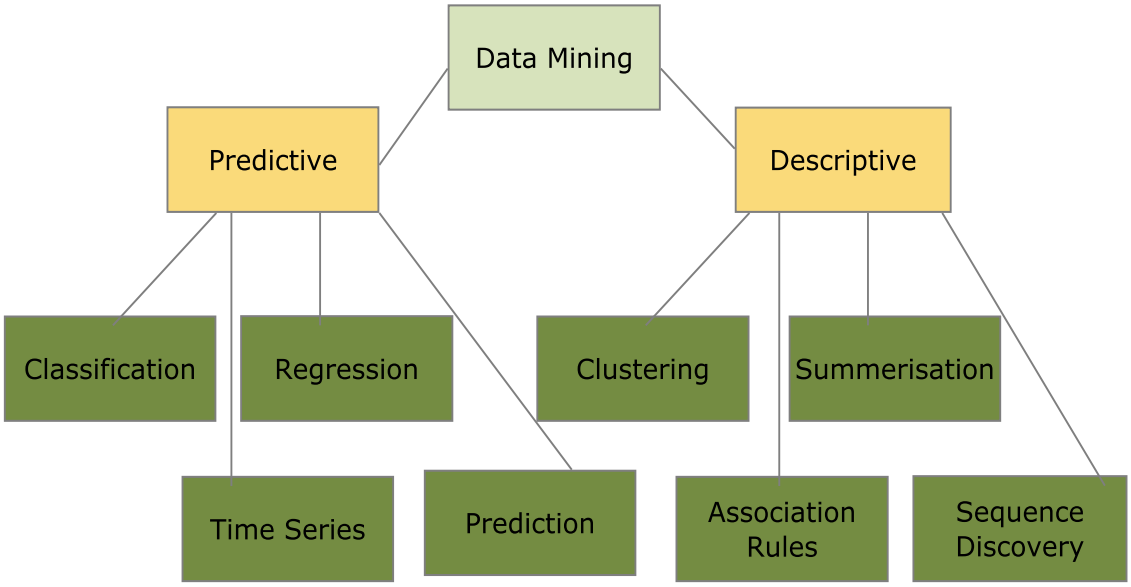
The final step is to use the discovered knowledge. The information achieved by DM can be used later to explain current or historical phenomenon, predict the future and help decision-makers make policy from the existed facts (Ho *et al.* 2005).

2.2.6 Data mining tasks and functionalities

Several DM problem types or analysis tasks are typically encountered during a DM project. Depending on the desired outcome, several data analysis techniques with different goals may be applied successively to achieve a desired result. In general, DM tasks can be grouped into two categories: descriptive and predictive. Descriptive mining tasks characterise the general properties of the data in the database. Predictive mining tasks perform inference tests on the current data in order to make predictions (Han & Kamber 2006).

Based on the different mining tasks, DM functionalities (methods) can be categorised as classification, clustering, regression, association rules, sequence discovery, prediction and so on (Dunham 2006). DM functionalities are used to specify the kinds of pattern to be found in DM tasks (Han & Kamber 2006). DM functionalities are shown in Figure 2.3.

Figure 2.3: Data mining functionalities, Adopted from Dunham (2006)



According to (Berry & Linoff 2004) basic DM functionalities are: classification, estimation, prediction, affinity grouping or associating rules, clustering, description and visualisation. The first three are examples of directed DM, where the aim is to find the value of a particular target variable. Affinity grouping and clustering are undirected tasks where the aim is to uncover structure in data without respect to a particular target variable. Profiling is a descriptive task that may be either directed or undirected.

- **Classification (Supervised learning):** Classification maps data into predefined group or classes. Classification algorithms require that the classes be defined based on data attribute values. They often describe these classes by looking at the characteristics of data which are already known to belong to the classes. Classification techniques are: Decision Tree: CART, C4.5, Bayesian Classification: Consists of two type, Naive Bayesian Classification and Bayesian Belief Networks, Neural Network, Support Vector Machines, Associative Classification, Lazy Learners (or Learning from Your Neighbours): k-Nearest Neighbour Classifiers, Case-Based Reasoning. Other Classification Methods: Genetic Algorithms, Rough Set Approach and Fuzzy Set Approach (Berry & Linoff 2004). Examples of classification are: classifying credit

applicants as low, medium, or high risk, choosing content to be presented on a Web page and determining which phone numbers correspond to fax machines.

In these examples, there is a limited number of classes and it is expected to be able to assign any record to one or another of them (Berry & Linoff 2004).

- **Estimation:** Estimation deals with continuously valued outcomes. Given some input data, estimation is used to assign a value for some unknown continuous variable such as income, height and credit balance or donation amount. Often, classification and estimation are used together, as when DM is used to predict who is likely to respond to the fund raising campaigns of a charity organisation and to estimate the amount of money donated by each supporter (Berry & Linoff 2004). Examples of estimation tasks (Berry & Linoff 2004) are: estimating the number of children in a family, estimating a family's total household income and estimating the lifetime value of a customer
- **Prediction:** Based on past and current data, many real-world DM applications can be considered as predicting future data states. Prediction is viewed as a type of classification. The difference is that prediction is predicting a future state rather than a current state. Actually, the difference is on the emphasis, since in predictive tasks the records are classified according to some predicted future behaviour or estimated future value. With prediction, the only way to check the accuracy of the classification or the estimation is to apply the model and then evaluate if its performance was the desired. That is, if the predictive task was to predict the customers who will respond to the next marketing campaign and buy the new product, the only effective way to evaluate the performance of the model is to wait until after the campaign and count how many of the target customers did actually buy the product. Prediction applications include speech recognition, machine learning and pattern recognition (Berry & Linoff 2004). Examples of prediction tasks (Berry & Linoff 2004) are: predicting which customers will leave within the next 12 months; and predicting which telephone subscribers will order a new service such as voice mail.

- **Affinity grouping or association rules:** Association rules are alternatively referred to as affinity analysis. An association rule is a model used to identify specific types of data association. They are usually used in the retail sales community to identify items which are often purchased together. The task of affinity grouping is to determine which things go together (e.g., what usually goes together at a shopping cart at the supermarket). Affinity grouping can also be used to identify cross-selling opportunities and to design attractive packages or groupings of products and services (Berry & Linoff 2004).

- **Clustering (Unsupervised learning):** Clustering is the task of segmenting a diverse group into a number of more similar sub-groups or clusters. What distinguishes clustering from classification is that clustering does not rely on predefined classes, examples, or target concepts. Clustering analyses data without consulting a known class label. In general, the class labels are not introduced in the training data simply because they are not known to begin with. Clustering can be used to generate such labels. The objects are clustered or grouped based on the principle of maximising the intra-class similarity and minimising the interclass similarity. That is, clusters of objects are created so that objects within a cluster have high similarity in comparison to one another, but are very dissimilar to objects in other clusters. Each cluster that is created can be viewed as a class of objects from which rules can be derived. Clustering is often done as a prelude to some other form of DM or modelling. Clustering techniques are: Partitioning: K-means and K-medians, Hierarchical, Density based and Model based (Berry & Linoff 2004).

- **Description and visualisation:** Sometimes the purpose of DM is simply to describe what is going on in a complex database, in a way that increases our understanding of the people, the products or the processes that produced the data in the first place. A good enough description of a behaviour will often suggest an explanation for it as well or, at least, where to start looking for it (Berry & Linoff 2004).

2.3 The growing importance IT and DM adoption decisions

The adoption of new and advanced IT in organisations has grown at a significant rate and has reached the point where it is embedded in the vast majority of organisations. It is argued that without the support of IT many organisations are not able to function effectively and that IT comes to play a strategic role in organisations (Avison *et al.* 1999). Serafeimidis & Smithson (2003) extend this argument stating that the role of IT has changed dramatically and is now viewed as a competitive and strategic tool.

IT has become critical to the support of the day-to-day operations and strategic positioning of organisations. Investment in IT and DM within organisations has consistently resulted in a wide variety of important improvements, on the design of the business, the work circumstances of employees and economic performance (Doherty & King 2005). This has led to IT decision making being one of the most important organisational and managerial activities (Doherty & King 2005).

Decision making practices for technology adoption such as DM are important to organisations as they assist in the reduction of the risk when committing to IT investments which it is believed will have a positive impact, either directly or indirectly on the overall prosperity of the organisation (Bacon 1992). IT investments improve the efficiency and the accuracy of work activities though the demonstration of these benefits has proven relatively difficult (Mahmood & Mann 2000; Wang 2007).

Before investing in any type of IT system such as DM, there is the decision phase in which alternatives are evaluated before a particular system is adopted. Different frameworks or methodologies have been proposed on how to go about making technology investment decisions but a common conclusion is that no single, simple methodology will give a consistent, reliable and optimal solution to managers facing an IT investment decision (Schniederjans & Hamaker 2003).

In management information systems there are three stages - strategic, tactical and operation planning (Irani *et al.* 2002). The strategic planning stage deals with developing specific systems to implement corporate-wide strategy, that is, a global perspective (Adler 2000). At this stage the strengths and weaknesses of the external environment are considered and the implications of this for internal analysis considered. Many studies indicate that there are numerous factors that encourage or hamper the adoption of IT applications and are a prime concern for many researchers and practitioners (Abrahamson 1991; Priem & Butler 2001; Greenhalgh *et al.* 2004). Two factors need to be studied closely when making decisions about IT investments - internal and external factors. Some examples of internal factors are: organisational components; management styles; competitive advantage; reduced costs and technological factors. Some examples of the external factors are: social, political, economic and financial crises. The focus of this research study is on the internal factors, specifically organisational components which are generally characterised by high business complexity regardless of the size which is a critical need for coordination and control of the business activities which, in turn, is related to the complexity of the information system (Howard & Hine 1997; Yasai-Ardekani & Haug 1997). According to Wang (2007), the function of top management requires developing an understanding of the capabilities and limitation of the proposed system, setting goals and then communicating the organisation's strategy to all employees which can increase the benefits of the IT and DM adoption. Since these factors play an important role in decision making of IT investments, it is important to study their impact on the strategic planning because this forms the establishing blocks for DM adoption decision making.

2.4 Internal factors affecting data mining adoption decisions

2.4.1 Organisational components

There is extensive discussion in the organisational and IT literatures to clarify the relationship between IT and DM adoption and organisational components. Preece *et al.* (2002) identified two levels from which to understand the relationship between IT and

the organisation. The first level concerns the impact of IT on organisations and assumes that IT causes many changes in the organisational context and is considered a major influence in the organisational world. The relationship, according to this perspective, is an influence relationship where IT is not only a change mechanism but also a key determinant of organisational components. The second level focuses on explaining the reciprocal relationship between the introduction of technology and the way an organisation changes. IT is seen as a change agent but a consideration of organisational components is equally important to utilise successfully any possible technology such as DM or to make any desired change. In other words, using IT tools within an organisation has significant implications for the organisation and all its components including structure, people, tasks and culture (Leavitt *et al.* 1988). To deal with these assumptions, the organisational forms, processes, structures and management need to be modified and sometimes reconstructed. On the other hand, the organisational aspects can direct the process of IT and DM adoption and impose certain courses of action to ensure the success of DM adoption. In this sense, the relationship between DM and organisation is interactional. Organisations must understand this relationship in order to persist and prosper in a changing global business environment.

Raymond *et al*. (1995) argued that the use of IT in the organisation is an important requirement in the development of organisational structures, forms and management strategies to improve organisational performance by reducing operation and transaction costs and differentiating products and services. Effectively, DM deployment results in changes to organisational structure, form and management in addition to operational changes that are related to the processing of organisational outputs including goods and services.

With the wide deployment of DM, all organisational levels will be affected and sometimes redeveloped to cope with the new internal environment that is created by DM. The new mechanisms of information processing and information flows within an organisation bring new changes that shorten the lines of communications through all

organisational levels. The considerable gap between these levels will not be trustworthy anymore since the information can be changed easily, smoothly and quickly through all organisational sections without the need for classic conventional ways of communication such as papers or face to face communication. The new flat reporting structure enabled by IT and DM can be used to renew all these traditional ways. Therefore, these ways of reporting can be reduced or sometimes eliminated through broad use of IT and DM such as the implementation of teleworking or computer - supported collaborative work systems (Cooke 1995).

2.4.2 Information technology and management

IT and DM will have significant effects on the structure and management of the organisation. There will often be new forms of work organisation and impacts on individual job performance, the establishment and structure of groups, the type of supervision and managerial roles required. In relation to organisational management, technology can change the core concept of management from controlling people and resources (centralisation) to participation and deputation (decentralisation). Two schools of thought have appeared concerning this issue. The first school claims that IT has increased centralisation in the organisation through controlling IT as an organisational resource. This extends the power which managers have and makes managerial activities more centralised. The second school believes that IT decreases centralisation and information availability to other members of the organisation and, therefore, makes them able to be engaged in some activities that were difficult to perform before, such as enterprise resource planning systems (ERP). As a result, top managers become more confident to delegate some of their duties to other organisational members at lower managerial levels. In addition, the use of IT cuts down the amount of time that is required to perform some jobs. This makes it possible for people who perform these jobs to participate in additional jobs that were previously performed by management.

On the operational level, introducing IT and DM into an organisation not only changes the way in which an organisation executes its operational activities but also redefines

some primary managerial duties such as planning, controlling, decision making, administering and so on. For example, Hochstrasser and Griffiths (1991) claim that IT threatens the role of middle management by offering a dramatic increase in the quality of communication between senior and line managers by cutting out redundant intermediary levels. However, it can be argued that the role of middle management is empowered through IT and DM adoption because their tasks can involve more strategic management than before but this requires empowering organisational culture to allow delegation of strategic tasks from top to middle and lower line operational management. How this is affected depends on the type of organisational management and its desire to delegate its formal power to lower level organisational members. Some issues like motivation, competence and tighter co-ordination among individuals and groups within the organisation and the need for skilled employees and visionary managers became even more important issues than ever before (Clegg 1990; McKersie & Walton 1991). Top managers are invited to acknowledge and encourage the availability of these success factors in order to encourage the adoption of IT and DM technology

In fact, describing the process of change within the organisation should be more comprehensive to give a real picture concerning the situation inside and outside the organisation. Writers like Boje *et al.* (1996) argue that the post-modern conditions create the need for a reconstruction process within modern organisations. This can assist management to adapt to any change that may take place inside or outside the organisational boundaries. This may lead to the adoption of DM within AIS as a powerful automated data analysis tool. This argument is supported by Castells (1998, p. 3) who states that:

> *Information technology is not the cause of the changes we are living through. But without new information and communication technologies none of what is changing our lives would be possible.*

Baskerville & Smithson (1995) argue that some technological adaptation methods like business process re-engineering and networked organisations enable the development of a new organic corporation to replace the traditional ways of organising. Furthermore, IT

enables the organisations to be more open to their customers, suppliers and shareholders/stakeholders as well as to their members by removing some previous constraints such as the limited working hours and direct traditional contact. This became realisable through using Internet technology (e.g., E-commerce, E-government and E-business).

The realisation of the benefits of IT and DM adoption and the prevention of any possible drawbacks or failures rely on management perception, understanding and appreciation of IT and DM. Management should be seen as a key factor in determining and influencing the ability to support/hinder the process of IT and DM adoption within AIS. Therefore, consideration of top managers as strategists and lower managerial levels as decision makers and mediators between top management and employees is important to the success of the IT and DM adoption process.

2.4.3 Awareness about and intention to adopt data mining

Understanding individual awareness and intention towards the use of DM technology is expected to facilitate the examination of the Jordanian publicly listed companies acceptance or rejection of the adoption of DM, since both the individual awareness and intention are postulated as the main predictors of this acceptance or rejection (Davis *et al.* 1989; Davis 1993; Pavlou 2003). The examination would also help to identify the determinants that would shape this acceptance or rejection.

The intention to use technology is influenced by two specific behavioural beliefs from the technology acceptance model (TAM). These two beliefs are perceived usefulness and perceived ease of use (Legris *et al.* 2003; Riemenschneider *et al.* 2003; Amoako-Gyampah & Salam 2004; Hsiao & Yang 2011). An awareness of DM terms will contribute to the intention to adopt technology.

2.5 Information technology and data mining adoption process

IT is a comprehensive and multi-faceted concept which expands to include many components and their applications on the individual and organisational levels. It includes hard components (software and hardware) which form the base of several applications that range from personal application to networking and Internet. All these applications involve the use of computer machines to accomplish individual or organisational activities. Within the context of this research, IT includes the use of Information and Communication Technology (ICT) to improve the way publicly listed companies' activities are performed and the way members of these companies communicate through inter-organisational activities and networking technology.

The process of IT adoption has been subject to considerable research in developed countries (e.g., Fichman 1992; Hanna *et al.* 1995; Dasgupta 1997; Baskerville & Pries-Heje 1998; Jassawalla & Sashittal 1998; Kaarst-Brown & Robey 1999).

- The IT adoption process has been discussed in different disciplines starting from anthropological and sociological research to technology research (Rogers 1995). It is a process associated with how a new idea or a new way of individual and organisational behaviour is communicated among people.
- The situation and individual perception of IT adoption depends on the individual's characteristics that play an important role in determining the individual's reaction to the adoption.
- IT adoption uncertainty is expected to be a major constraint where individuals deal with IT adoption with suspicion and ambiguity (Rogers 1995). The degree of uncertainty, as Rogers argues, depends on the available information concerning the particular adoption. Therefore, he argues that technological adoption, in particular, reduces the degree of uncertainty because it embodies information, but at the same time generates another kind of uncertainty about the expected consequences that emerge from what he calls innovation-

evaluation information. In this regards, it can be argued that not only information availability determines the degree of uncertainty but also the nature of the adoption process (being planned or spontaneous) and other organisational factors that have to be considered. The most important of these factors is the nature of organisational management which influences the degree of information sharing and availability.

The characteristics of IT and DM adoption itself are also important to explain the rate of adoption. IT Adoption that is perceived by individuals as having greater relative advantage, compatibility, trialability, observability and less complexity is expected to be adopted more rapidly than other adoptions (Rogers 1995).

Rogers (1995) claims that the IT adoption process is a particular type of communication in which the message content is concerned with a new idea which one individual transfers to one or several others. He argues that effective communication between individuals is based on both similarity and dissimilarity among individuals where IT adoption is transferred. On the one hand, similarity among individuals in some aspects (e.g., education, social status, age) are considered as a good base to exchange the information regarding IT and DM adoption because similar people are normally attracted to each other and affect each other more than dissimilar people do. On the other hand, dissimilarity between individuals, especially in some aspects related to the IT and DM adoption itself, e.g., experience with IT and DM adoption, technical knowledge, can permit new information to be exchanged through the communication process between experienced and more knowledgeable members to less experienced and less knowledgeable members of a social entity.

2.6 Approaches to model development

In his review of the IT adoption literature, O'Callaghan (1998) identifies two basic models that influenced this literature. The first model views IT adoption as a process of communication and influence. People are informed about the new technology and are

convinced to adopt this technology through their communication with prior users. The second model views IT adoption as an economic process where the decision to adopt or to reject the new technology is determined by the cost of adoption and the benefits that can be achieved as a result of the adoption of new technology. In fact, it can be argued that the success of the IT and DM adoption is determined by both the availability of effective communication which enables exchanging information concerning the IT and DM adoption and the economic benefits which can be realised as a result of the IT and DM adoption. An effective communication process enables the achievement of available economic benefits. In contrast, weak or ineffective communication may cause the failure of the IT and DM adoption process which could lead to the loss of economic benefits. Economic benefits, on the other hand, may motivate the communication process which can lead to increased growth and acceptance of IT and DM. The evaluation of economic benefits of IT and DM adoption and the effectiveness and efficiency of the communication mechanism that increase the rate of IT and DM adoption are determined by managers of an organisation. Accordingly, IT and DM adoption is implicitly or explicitly affected by organisational management perception of the benefits of IT and DM and their styles of management which determine the organisational mechanism of communication, precipitation and information sharing.

Furthermore, a number of researchers has identified IT adoption models that may assist in understanding the adoption process. The first is the structural model which describes the process of IT adoption as a structural process which involves a sequence of steps (Zaltman *et al.* 1973; McFarlan *et al.* 1982; Cooper & Zmud 1990; Rogers 1995; Dasgupta 1997). The second is the socio-technical model which provides a more comprehensive description of the IT adoption process and concentrates on individual and social aspects as well as on technical ones (Davis 1989; Davis 1993; Auer & Ruohonen 1996).

2.6.1 Structural model

Until 1973, IT adoption studies had considered the individual as the main unit of analysis. Zaltman *et al.* (1973) expanded this view from an individual level of analysis to an organisation as the main unit of adoption. They used the process approach to explain IT adoption. According to this approach, IT adoption is composed of a set of stages or phases ordered along the temporal dimensions of their anticipated sequence. However, they emphasised that IT adoption should be viewed as involving an interrelated and complex set of forces that shift over time. This view draws the attention towards considering IT adoption as a collective process starting with a knowledge-awareness sub-stage and ending with continued-sustained adoption (Zaltman *et al.* 1973). Rogers (1995) supports this argument claiming that the IT adoption process involves five steps that usually occur in a time-ordered sequence of; knowledge, persuasion, decision, deployment and confirmation. This classification is emphasised by Dasgupta (1997) who views IT adoption as a collective process which involves introduction, assimilation and permeation of information systems technology throughout an organisation.

McFarlan *et al*. (1982) proposed an IT adoption procedural model which includes the following four steps.

1- Technology identification and investment which include learning the application of new technology.
2- Experimentation, learning and adaptation which include user's awareness of the new technology and the problems it can solve.
3- Rationalisation and management control which include up-grading staff to acceptable knowledge levels that enable them to work with technology and control it.
4- Widespread technology transfer which includes spreading the benefits of technology into other units.

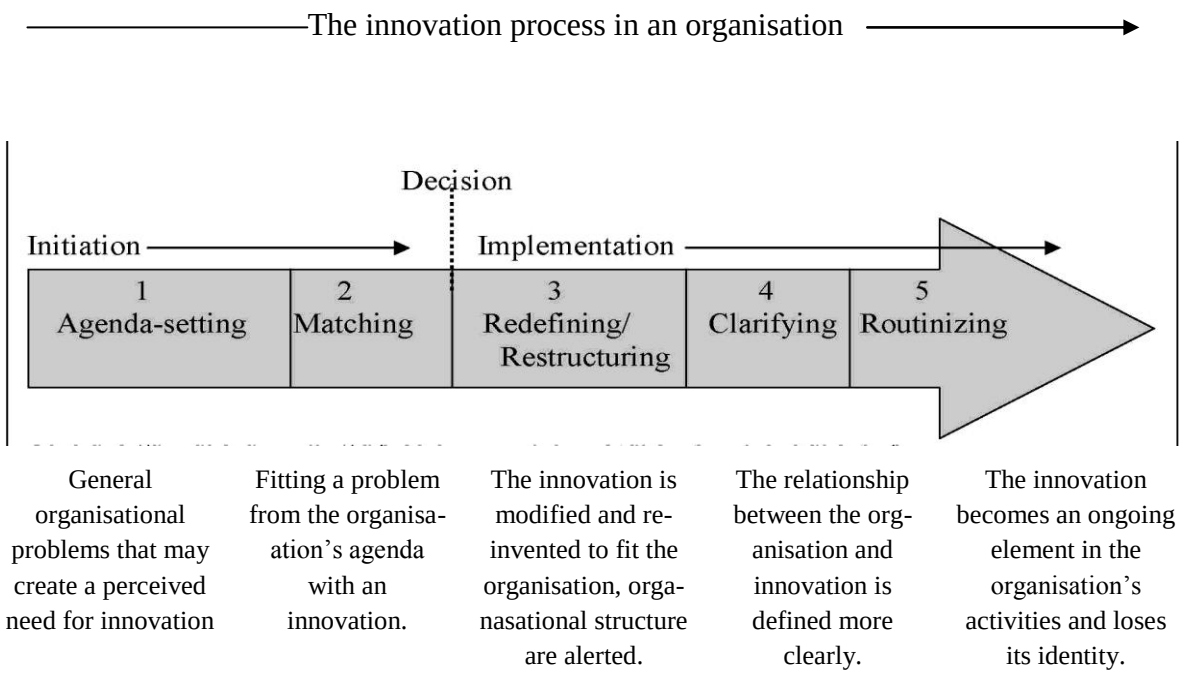
This model depends largely on experimentation as a way to achieve a successful IT adoption process. This increases the cost of IT adoption. In addition, it starts with technology identification as the first stage in the IT adoption process without considering some human aspects such as the perception of organisational management and technical skills among users of the new technology. This can lead to the failure of the IT adoption process.

Cooper & Zmud (1990) present an IT adoption perspective model. According to this model, the adoption of IT starts first when there is a pressure to change (initiation stage). This pressure leads the managers of organisation to make decisions to adapt this change (adoption stage) through development, installation and maintenance of new technology and the development of new organisational procedures (adaptation stage). If users accept this technology (acceptance stage), it becomes a normal activity (routinisation stage). The final stage of IT adoption process according to this model is the infusion stage which includes the integration of new IT with the organisation's systems to support higher levels of organisational work. This model is more comprehensive than previous models and considers all stages that are necessary to the success of the IT and DM adoption process. It also considers the partial deployment of new technology as a way to enhance the IT and DM adoption process. However, the user acceptance of the new technology should be considered before the adoption process, which includes development, installation and maintenance of new technology. This can ease the adoption process through giving the users the opportunity to contribute to this process. It also can reduce the cost of IT and DM adoption through supporting the decision- making process and reducing the users' resistance to the new arrangements that may be introduced as a result of the adoption of new technology.

According to Rogers (1995), the IT adoption process within the organisation consists of two phases including initiation and implementation and the usual sequence of five stages (Figure 2.4). The wide distribution of technological innovation can be the best example to explain the processes of redefining innovation and restructuring of an organisation

where any computerised system is defined or, in most cases, designed to match the organisational requirements (Davis 1993; Rogers 1995).

Figure 2.4: Organisational innovation process, Rogers 1995: p392



As the process of IT and DM adoption goes on, uncertainty that surrounded the new innovation will be reduced through the establishment of general understanding of this innovation. Appropriate social construction and organisational support are needed to improve this process. When all the questions about the innovation are clarified, innovation becomes the norm and is incorporated into the common organisational routine.

It is observed that the structural model of IT adoption has been used to describe the adoption of IT as a programmed process which follows certain steps. This view provides limited insights as no consideration is given to social aspects of organisations and the important inter-correlations processes which take place prior to adoption. One of the major limitations of classical IT adoption theory, which represents the structural model, is the assumption that individuals adopt IT for their own independent use rather than as a

part of a larger community of interdependent users (Auer & Ruohonen 1996). Therefore, the influence of each organisational group on others has to be considered. As managers are the power holders and the most dominant group on the organisational activities and its members' behaviour, their behaviour and perception with respect to IT and DM adoption should be considered and investigated. This provides a reliable indication of organisational innovativeness and readiness for IT and DM adoption.

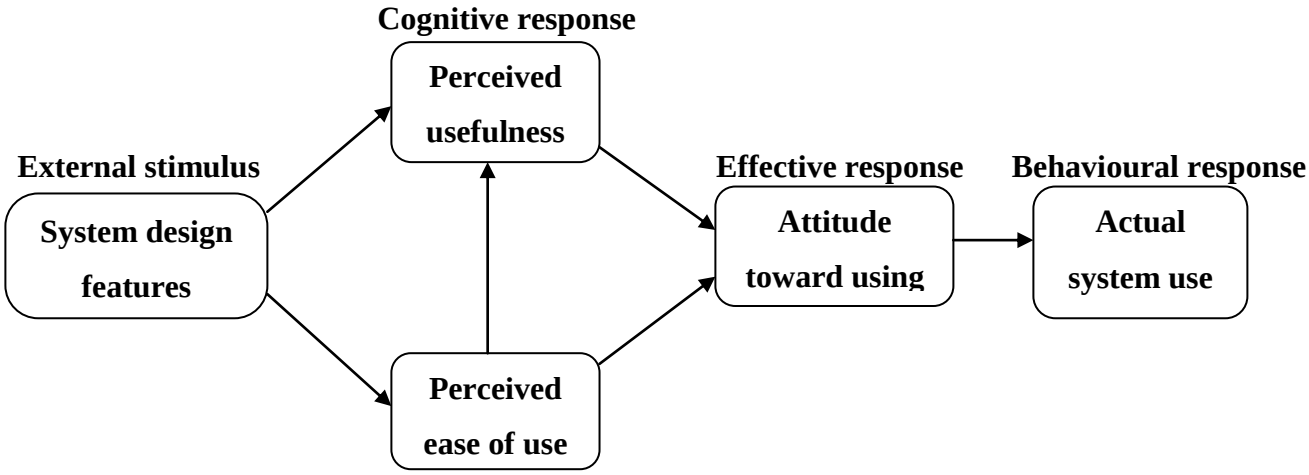
Moreover, viewing the IT adoption process as a set of structured procedures that occur within a social system ignores the basic concept of IT adoption as a changing element that affects the social system of a particular context. Successful IT and DM adoption should investigate and consider the varying social elements of this complex and diversifying context. The socio-technical model was an attempt to cover this gap.

2.6.2 Socio-technical model

The Technology Acceptance Model (TAM), proposed by Davis (1993), is a model of IT adoption and operation that is designed to explain computer usage. This model defines the causal relationships between system-design features, perceived usefulness, perceived ease of use, attitudes towards using and actual usage behaviour. It is mainly used to explain the affect of system characteristics and end-user behaviour on the actual system use. Figure 2.5 outlines the major elements and relationships as presented in this model.

This model assumes rationality in human behaviour through decreasing the importance of ease of use and expressing the importance of perceived usefulness. Although this assumption may be correct when people have the level of proficiency which enables them to recognise and evaluate the usefulness of the target system, people who do not have enough knowledge to realise the advantages of this system may only be motivated by the ease of system use.

Figure 2.5: Technology acceptance model, Davis (1993; p476)



The emphasis on the relationship between attitudes and behaviour tends to ignore the fact that attitudes will not be related to behaviour when people are not free to behave according to their attitudes (Winter *et al.* 1998). Through describing perceived usefulness and perceived ease of use as the two elements that influence attitudes towards using the new technology, this model ignores other elements that may have an affect such as management approach, the external social pressure performed by some individuals and groups within the organisation, cultural conflicts and personal characteristics of the technology users. For example, in their study to assess the ability of TAM to explain IT adoption and use in USA, Switzerland and Japan, Straub *et al.* (1997) explain that while TAM provides an explanation for IT adoption and use in USA and Switzerland, it does not provide an explanation for the Japanese experience. They find that cultural factors in the Japanese culture, e.g., uncertainty avoidance behaviour, greater power distance, collectivist sentiments and masculinity, can explain the failure of TAM in predicting computer usage behaviour in Japan. Their study emphasises the importance of cultural differences within the context of IT adoption research.

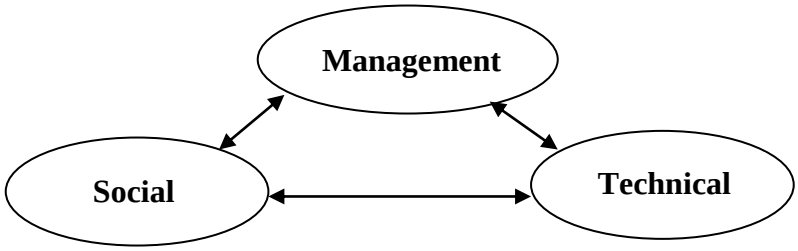
Although this model considers some elements of the social context within the adoptive environment, other key organisational characteristics have not been considered. Ignoring

the role of these characteristics can make the process unable to reach to its normal and theoretical end according to this model or any other IT adoption model. This normally happens in some large bureaucratic organisations where top managers make adoption decisions without any previous consultation or any subsequent training (Abdul-Gader & Alangari 1996).

In his review of IT adoption literature, Fichman (1992) argues that much of the IT adoption theory was developed in the context of adopters making voluntary decisions to accept or reject the adoption based on the benefits they expect to gain. TAM is an example of this direction. However, he argues that individual adopters rarely have complete autonomy concerning the adoption and use of IT. One can argue that managers as power holders in all organisational levels play the most important role in the process of IT and DM adoption. In the first instance, they have the responsibility of evaluating the economic benefits of IT and DM adoption and have the ability to promote effective communication among organisational members. They, also, through their styles of management and their knowledge of IT and DM, can influence individual behaviour towards the use of IT and DM.

Auer & Ruohonen (1996) present a wider explanation of the IT adoption process and emphasise the importance of management within the information systems environment. They indicate that organisational maturity, in relation to information systems management, is related to three primary components and their interaction. The first is the social component, which is related to the users' abilities to utilise IT in their daily work (users' skills and knowledge). The second is the technical component, which includes hardware and software technologies. The third is the management component, which is the mediator in their maturity model. The human component includes management and social components and their reciprocal interaction with each other as well as with the technical component. All these organisational components have to be in balance in order for the organisation to accomplish its development strategy or implement any potential IT project. Figure 2.6 illustrates this model.

Figure 2.6: Organisational maturity in the context of IS management and use, Auer and Ruohonen 1996: p6.



This model has not stated specific relationships and interactions between IT adoption and the organisational management. The investigation of this relationship is important since management can encourage adoption explicitly through expressed preferences and mandates or implicitly through reward systems and incentives (Fichman 1992). Managers who have positive attitudes towards IT and DM are expected to play a significant role in encouraging other organisational members to accept the use of IT and DM in performing their daily activities. Consequently, within this research a model will be developed to integrate classical IT adoption theories that focus on the willingness of individual adopters and more recent IT adoption theories that view IT adoption as an organisational process which is influenced by organisational management.

As discussed above, the available models of IT adoption were developed based on studies that were conducted in developed countries and therefore may not be suitable to explain the process of IT and DM adoption in other countries. A review of IT adoption literature in developing countries may clarify this issue.

2.7 Information technology adoption in developing countries

Few studies have discussed issues related to IT adoption in developing countries (Abdul-Gader & Alangari 1996; Kirlidog 1996; Rose & Straub 1998; Montealegre 1999; Harris & Davison 2002; Straub *et al.* 2002). Rose & Straub (1998) investigated the

applicability of TAM (Davis 1989; Davis 1993) to IT adoption in the Arab world. They argued that social and cultural beliefs are key issues to IT adoption in Arab countries. However, their investigation did not assess particular social or cultural aspects. Kirlidog (1996), in his study of information systems in Turkey, examines the relationship between management practices and IT applications and claims that the information is most likely transferred in one direction (from top to bottom) within the organisation in the form of directions and commands. He also claims that people in developing countries are generally unwilling to take risks and thus uncertainty avoidance behaviour is exhibited (Hofstede 1984; Hofstede 1994; Daft 1998). The desire for risk and uncertainty avoidance acts as a high entry barrier for information systems development in developing countries (Kirlidog 1996). Moreover, Carnoy (1997) claims that the lack of highly skilled management and flexible self-confident labour are considerable barriers to the adoption of new technology in developing countries. According to Abdul-Gader & Alangari (1996, p. 113):

> *The richness of IT literature has primarily focused on organisations in the developed hemisphere. Even in the sporadic literature on IT in developing countries, one rarely encounters scholarly reports on IT assimilation problems in these countries' organisations. Most studies are descriptive in nature.*

In their research about IT assimilation in Saudi public organisations, Abdul-Gader & Alangari (1996) reveal that human resources issues are the most important barriers towards IT assimilation in Saudi public organisations.

Concerning the impact of IT adoption on the situation within developing countries Nulens (1997) identifies three streams of research. The first and argued to be the most dominant stream of this research is based on a world vision that overestimates the one-way power of technology. In his view, the information revolution will give developing countries the opportunity for development and eventually all countries of the world will become more equal. The second stream is based on the assumption that IT will only increase the existing inequalities and power relations between developed and developing countries. The third stream of research views technology as a part of the society, which

has no advantage without other parts. Therefore, according to this stream, the belief of an autonomous or self-directed technology is a misconception where technology cannot stand alone without considering other aspects of its environment. The second stream seems more appropriate because it has a political base that directs the technology transfer into developing countries. However, that does not mean that IT deployment itself is something that should be avoided. One can argue that developing countries can successfully utilise IT and DM through creating an appropriate IT and DM foundation that is based on a high-quality economy and self-reliance. In doing this, developing countries should consider their individual needs and the characteristics of their own contextual frameworks (socio-cultural characteristics of each region) free of any political or economic pressure from developed countries.

Some problems that face developing countries and prevent successful utilisation of IT include: the lack of technological consciousness of managers and civil employees, the lack of knowledge about the best way to acquire technology and the lack of capacity to design and develop their own technologies (Nulens 1997). Hanna *et al.* (1995) claim that several structural barriers may constrain the IT adoption in developing countries. Some of these barriers are slow educational response to new universal technologies, poor telecommunication infrastructure, poor technical and managerial capabilities, poor regulatory framework and low domestic demand for IT. Another restraint, which is identified by Heeks & Stanforth (2007), is related to the justification of using technology. The achievement of the financial cost-cutting goal is questionable in developing countries' context where replacing cheap humans with costly ICTs is unlikely to be defended on financial cost grounds. In contrast, within the context of developed countries, replacing costly humans with cheap ICTs may cut costs. Therefore, the emphasis in developing countries should be directed towards other achievements (e.g., increase process speed, improve the quality of services) in order to provide some grounds for automation. Therefore, in their study of e-government development in developing countries, Heeks & Stanforth (2007) state that the few success stories mentioned in some studies are the exception rather than the rule for two reasons. The

first is related to the lack of electronic-readiness, the second is related to the lack of information and research that may help e-governance initiatives in these countries. This, in turn, creates design-reality gaps.

A survey conducted by two international IT firms, Zogby & Artoc (2001), showed that the principal weaknesses in the Arab world in relation to IT include: lack of technological know-how; lack of planning/strategy; lack of Arab co-operation; lack of financing; politics/bureaucracy; incorrect thinking/bad leadership; lack of infrastructure; language problems; and lack of co-operation with outsiders. Conversely, when 210 IT professionals were asked to assess the principal strengths that the Arab world can bring to its planning for IT development, the conference participants suggested the following: human -resources/trained personal; financial resource; common language; Arab large market; scientific and technological progress; co-operation between Arab countries; and natural resources. Only 24 % of the participants considered technical and infrastructure related issues as weaknesses for Arab's IT situation. Hill *et al.* (1998) who investigated the culture of Arab countries and its influence on IT transfer revealed that Arab organisations that successfully introduced IT have paid more attention to the cultural beliefs in these organisations. They go further to identify specific social and cultural aspects that affect IT transfer. Social aspects, in their view, include social class, personal relations in work-groups and educational levels while cultural aspects include face-to-face interactions, allegiance to family and kin group, concept of time and religion. Based on their field study, they also identify some impediments for IT transfer to Arab countries. These include: lack of finance; conflict with personal values; lack of knowledge/experience; lack of training; lack of education; fear of loss identity; and fear of being controlled.

As discussed above, several impediments were revealed in previous studies that may have effects on IT adoption in developing countries. These impediments may have an effect on the adoption of DM within AIS in publicly listed companies in Jordan as DM and AIS are part of IT.

2.8 Observations and directions

The few available studies that investigated the issue of IT adoption in developing countries have presented a negative view of the current state of IT adoption in these countries (Besley & Case 1993; Vatanasakdakul *et al.* 2004; Molla & Licker 2005). They tend to overestimate the weaknesses and underestimate the strengths. This seems improbable and implicitly assumes that developing countries are far from successful in the exploitation of modern technology. In contrast, one can argue that the use of IT has assisted the achievement of desired changes in management practices and overall organisational performance in some developing countries. Some examples presented by Kaul (1997) include the Malaysian government public service network, which enabled the government agencies to offer their services online. The Singapore government experience is another example where a civil service program has generated S$2.71 in return for every dollar spent on computerisation. Furthermore, some countries like Ireland have totally built development and investment strategy on the establishment of an effective and easily approachable IT industry (Al-Jaghoub & Westrup 2003). India is also viewed as an advanced country technologically (Higginson 1993) and is exporting highly skilled people to developed countries including Western Europe and USA.

These countries are seen as trustworthy examples which show the possibility of establishing a successful IT-based economy in some countries that have no natural resources apart from its skilled technical work-force. Powerful coordination by the governments of these countries, low wages, the huge local market in some developing countries (e.g., India) which encourages the emergent of some local IT companies and the multicultural base of some developing countries are all seen as important factors that strengthen the developing countries' capability to achieve successful IT adoption process.

Moreover, the few available studies in the area of IT adoption in developing countries have not yielded deep insights for three key reasons.

- The first reason is the fact that the area of IT is still a relatively new phenomenon in most developing countries. Therefore, the time has provided limited opportunity to explore some issues related to IT including IT and DM adoption.

- Most of the researchers who handled these studies were not practically involved with the contextual environment in these countries. Therefore, they most likely reflect their theoretical knowledge on their studies, which may be derived from their own contextual and managerial perceptions. The tendency towards adopting the results of these studies cannot be meaningful due to cultural, managerial, political, economic and technological constraints and differences (Kirlidog 1996).

- The researchers or, in some cases, institutions who explored the area of IT in this particular area of the world are more likely to be motivated by economic motivators than human or managerial development (real value to these countries) because of the great potential IT market in this area where 80% of the world's population live and the relatively low wages' level in these countries. For some companies that intend to increase their market share and expand their business, these factors are critical. One example of this is reported by El-Rifai (1993)who examined the investment policies that were followed by multi-cultural corporations in seven Arab countries during the eighties. He revealed that these corporations were frequently not interested in developing export-oriented industries but, instead, were inserted in displacing national producers as suppliers to the local market. He also revealed that techniques of production were considered to be highly secretive and the transfer of technology was directed to match the interests of these corporations.

For these reasons, developing countries' researchers have to establish research practices conformable with their own cultures. They are most likely more able to realise the economic and communication processes involved in DM within AIS adoption process. But the important question is from where this research should start?

It is observed that the lack of IT and DM adoption within AIS research that considers organisational management perspectives and impacts is a predominant issue within developed and developing country. Pinsonneault & Rivard (1998) argue that the current state of empirical research results from a failure to understand the interaction between IT and the nature of managerial work. Accordingly, this research views organisational management as a substantial factor which influences organisational members' perception and behaviour towards IT and DM adoption within AIS. In particular, this research argues that the investigation of managers' attitudes towards the use of IT and DM and the intercorrelation between these attitudes and the management styles may help clarify the possible impact of management on IT and DM adoption within AIS and the managerial role in the adoption process within the organisational context. These are investigated as significant determinants of organisational innovativeness and individual adopters' behaviour. Managers as strategy formulators, decision makers and implementers and the key influential group have received little attention in the previous research within developed and developing countries. Exploration of the interactions between their perception concerning IT and DM adoption within AIS and their styles of management which, as one can argue, determine the nature and direction of communication, interaction and participation is seen as an important contribution which has important implications for strategy makers. This trend can be described as a new return to the main principles of the adoption process that view IT and DM adoption as a social more than a technical process which can provide a considerable contribution not only to the IT and DM adoption research in developing countries but also to developed countries' established literature.

Considering the growing importance of IT and DM in the process of publicly listed companies' reform and the distinctive contextual and cultural framework of publicly listed companies, the focus of this research will be on publicly listed companies' sector domain. The new trend towards publicly listed companies' reform and the scale of IT and DM adoption within AIS in this context make the results of this research more useful. In particular, this research explores the Jordanian context as an example from the

wider Arab and developing countries' contexts. Jordan is an Arab developing country that has started recently to explore the use of IT to improve the development of its economy and to achieve successful integration with the global environment (Al-Jaghoub & Westrup 2003). The selection of this particular context is expected to increase the contribution of this research since little research has generally investigated the developing countries context and negative perspective has been explicitly or implicitly emphasised. In addition, the researcher's experience, knowledge and understanding of the Jordanian circumstances support the selection of this context.

2.9 Research hypotheses

On the basis of the above discussion, and to describe the manner in which the above mentioned factors are assumed to influence manager's decisions towards the adoption of DM technology a set of research hypotheses are posited. Each hypothesis describes a positive or a negative relationship between a dependent construct and an independent construct. Each construct reflects one of the identified issues and all the hypotheses imply prediction or correlation rather than causation.

The posited research hypotheses are:

Hypothesis One:

In Jordanian publicly listed companies there is a readiness by personnel to adopt data mining technology.

Hypothesis Two:

Technological, organisational and human resource issues are significant influences in the decision to adopt data mining technology.

Hypothesis Three:

Technological, organisational and human resource issues are significant reasons in the decision not to adopt data mining.

Hypothesis Four:

There is a significant relationship between awareness of data mining and the intention to adopt data mining tools.

2.10 Conclusion

This chapter provided a general background and theoretical foundation towards understanding the major contents of this research and identifying its general boundaries. A review of IT adoption literature has revealed that IT adoption studies in developed countries have adopted either structural (procedural) or socio-technical model. The first model has dealt with the adoption process as a structural process that includes a sequence of steps that considerably underestimated the complex nature of organisational setting. The second model has considered some organisational issues and provides a general frame work of analysis but does not explore specific relationships between these aspects and IT adoption process. Although both models of IT adoption have explicitly or implicitly considered management as a key success factor in determining the success of IT adoption, few researches have examined the interactional relationship between management and IT. Within the context of developing countries (i.e., Arab countries), few studies have investigated IT adoption. These studies have not provided deep insights regarding this area. They, in fact provided a negative view concerning IT adoption within this context. This is due to the novelty of IT in developing countries, misunderstanding of cultural variations by the researchers of other countries and the dominance of economic incentives on these studies that were performed by some companies or researchers from developed countries.

Overall, a review of IT adoption literature in developed and developing countries has directed the focus of this research towards investigating a very specific organisational issue which is related to the management style, as a key determinant of IT adoption success and its interaction with managers' attitudes towards IT. This issue is explored within the Jordanian publicly listed organisations as a part of its wider Arab and developing countries contexts.

The next chapter discusses traditional and new management models and the role of IT concerning the managerial change in the last few years. A particular attention is given to the reciprocal relationship between management styles and IT including DM.

3 Management Styles

3.1 Introduction

This study has two parts. Chapter 2 focused on the common definition of AIS and DM and the adoption models . In this chapter the second aspect of the research question is explored – management styles and the role of IT with respect to managerial change is considered.

Particular attention is given to the reciprocal relationship between management styles and IT including DM.

Over time there have been numerous studies that have looked at management styles (Buchholz 1977; Rarick 1987; Reed 1992; Wang & Clegg 2002). Studies have also explored new management styles (NMS) appropriate to the technological age. Traditional management styles are firstly reviewed with particular reference to the context of developing countries. Secondly, attributes of the NMS are identified and compared with the traditional styles, once again with reference to developing countries. Finally, a critical evaluation of literature focused on Arab management is presented. Research questions are identified concerning IT and DM adoption and related to management styles focusing on the Jordanian publicly listed organisation.

3.2 Traditional management styles

Management literature is enormous and has been widely researched since the end of the 19th century. Different managerial theories have been proposed since that time to explain management practices and their role within the organisational context. Bureaucracy may be the most traditional form of organisational and managerial thinking. Max Weber mentioned that bureaucracy was the ideal type or model for any large organisation. It is a form of organisation that is based on hierarchical authority

structures and a highly specialised functional division of employees (Reed 1992). Bureaucratic organisations are based on the impersonality of relationships between organisational members where the differentiation of private and official forms of social relationships is a necessity. Thus, in theory, recruitment of officials and managerial elite is built on the basis of ability and technical knowledge and not nepotism or personal relationships. Bureaucratic organisations are required to be highly rationalised, which means that individuals within an organisation are expected to act in a rational and logical way in any situation. However, the above characteristics are for the ideal bureaucratic organisation and seem more theoretical than practical. Any organisation cannot properly operate or be organised relying solely on these factors alone. Impersonality and high rationality can only be carried out under explicit orders within an organisation and with guidance from senior management. It would appear that these characteristics do not present an accurate picture regarding the real situation in any organisation. Wilson (1992, p. 51) stated supporting this argument:

> *Not only were individuals largely incapable of acting wholly rationally, but also that the organisations themselves were institutionally incapable of acting irrationally.*

Further the performance of organisational work in the bureaucratic organisations has been found to be relatively inflexible where fixed rules and instructions guide organisational activities and management decisions.

Another traditional management style is the authoritarian approach. Managers who adopt an authoritarian approach lay down clear rules for subordinates and expect them to obey not only the rules but the also the manager with authority without any consideration to human aspects. This approach focuses on centralised authority, fixed rules and procedures, top-down policies, clear lines of authority and specialisation (Rarick 1987). According to this approach, managers practise absolute authority and workers just accept orders and carry them out. The organisational environment is stable and leaders are able to control any change that may develop. For example, the adoption of IT and DM under this management style will be decided by top managers and

administrators without consulting subordinates, there will be rewards for obeying the rules and consequences for breaking them.

This style was not workable, as assumptions about people and conditions focused on one-communication, top to bottom, were de-motivating and created a “them and us” attitude between managers and workers. As a result, an alternative emerged which has been referred to as the human centred model. This is based on the development of human resources as a choice to increase productivity and focuses on the importance of group behaviour and employees satisfaction (Rarick 1987). IT and DM adoption under this approach will be decided as a consultative process between different organisational levels. However, Buchholz (1995) argues that the dominance of the humanistic belief system has not changed the managers' view regarding employees' participation in the decision-making process where managers are still reluctant to change the existing authority structure to permit employees to participate fully in the decision-making process.

In a search for a comprehensive classification of management styles and their effect on the adoption of IT and DM, Reddin (1970) defines four basic styles of managers. The first is the separated manager who insists on complying with the rules or defined principles. The separated manager has a separated authority based on his/her managerial position and organisational rules. The second is the related manager who focuses on people’s interests and makes good relationships with them. In general, he/she is a human more than a technically directed manager. The third basic style, according to Reddin is the dedicated manager who guides the work of others and sets individual tasks to achieve the organisational goals. He/she has a lot of experience about his job and usually uses his/her experience to determine problems and solutions. The final style is the integrated manager who uses both task and relationships orientation and attempts to establish a co-operative environment to achieve the organisational goals. To do this, he/she applies a variety of participative techniques and reduces power differences between him/her and the employees. The integrated management best reflects the

diversity of management styles and includes varying aspects of management styles that are essential for managers in different situations. It affords a representation of a 'no ideal style theory' which is seen as a flexible and adaptable managerial mode of thinking.

A similar but narrower classification of management styles is introduced by Wang and Clegg (2002) who compare the decision-making styles of Chinese and Australian managers, finding that significant differences exist. Considering some cultural aspects and based on his review of management styles, Wang adopted four categories of management styles.

1. Autocratic, the manager makes decisions unilaterally and without much regard for subordinates.

2. Consultative, the manager seeks input and advice from the group before making a decision for a group, but then makes the final decision himself or herself.

3. Joint, the manager allows the employees to take part in decision-making; therefore everything is agreed by the majority.

4. Delegative, the manager transfers decision making power to one or more employees, but remains responsible for their decisions.

They report that both countries have a different cultural background where Australia has mainly the Western, Anglo-Celtic cultural background. China, on the other hand, has collectivist and Confucian culture (Wang & Clegg 2002) which, can be argued to be related to other Asian countries such as the Arab culture. Accordingly, the style of decision-making is a distinctive or characteristic mode of action or manner in performing the decision-making process (Wang & Clegg 2002).

Managers can use different levels of participation in decision-making to achieve a high quality decision and a high level of co-operation and commitment by the participants. Different styles of management involve different levels of participation. Therefore,

participation in the decision making process is always a key factor for recognising various styles of management. Wang and Clegg (2002) distinguish between four types of participation in relation to the decision making process: formal/informal participation and direct/indirect participation. Informal participation, as they claim, is characterised by individual relationships between the manager and employees where the manager may look for advice through casual conversations or informal group meetings. Formal participation, on the other hand, requires following a set of written rules and regulations on how decisions should be made and who should be consulted. Direct and indirect forms of participation, as reported by Wang and Clegg (2002), require issues of who actually makes the decisions. In direct participation, workers assist the manager to make the decision and sometimes they themselves make the decision. In the case of indirect participation, workers provide advice and help for decision makers who make the final decisions themselves. The form of participation affects the degree of participation in practice.

Hofstede (1984; 1994) indicates that the degree of individualism or collectivism within a culture and the power distance may determine the degree of participation in organisations and the nature of relationships within the organisational environment. For instance, Wang and Clegg (2002) report that the characteristic of Chinese culture (collectivist and high power distance) may discourage participation in the decision-making process. However, his empirical investigation of the decision-making process in China showed that Chinese managers use formal forms of participation such as consulting with professionals or formal group meetings (Worker Congress). In spite of this, he assumes that authoritarianism remains strong among many Chinese managers. In this regard, factors like loyalty-based management, the value of trust and hardwork, family rather than contractual-based relationships and respect for older and higher managerial positions are key factors that differentiate Chinese management and apply certain managerial styles. Some of these managerial concepts are prevalent in Arab management.

Earlier styles of management and organisational philosophies (i.e., bureaucratic and authoritarian) were based on hierarchical authority structures and presumed rationality in organisational and human behaviour (Reed 1992). They were not able to reach the balance between organisational interests (e.g., effectiveness and efficiency) and human interests (e.g. appropriate social environment, personal autonomy). Moreover, these managerial approaches were conceived for an industrial past where manufacturing dominated industry and they may not be completely applicable for a greatly different economy, which is based on knowledge and remarkably growing computer power because they do not have the level of flexibility, which enables the organisations to respond to the rapidly changing environment (Halal 1998; Hughes 1998). Reed (1992) emphasises an understanding of the sociology of organisations proposing that managers should focus on individuals within the organisation. The aim here is to assist personal development in order to create a collective culture in the organisation as a unified social unit. He also argued that the production system in the post-modern organisation should be changed to be a customer-oriented more than the mass-production system. Thus, understanding and analysis of different types of management is important for the managers in order to identify the customer's needs and to appreciate the organisational members' interests, knowledge and potential contribution which highly rely on the selection of appropriate styles of management styles.

It can be argued that the effective style of management must balance the needs of people and work at the same time. The diversity and flexibility of the management styles is derived and based on the varying attitudes which people have regarding the way they prefer to be managed in order to work effectively and perform efficiently. While some people, for example, like to work as team members, others may prefer to get detailed directions or work independently (Chatman 1991). The style of management should afford a distinctive set of guiding principles that set parameters to and signposts for management action (Purcell 1987). However, certain degrees of participation and effective communication are necessary to enable the exchange of knowledge and information regarding the implementation of organisational change.

Organisations today face turbulent change; they grow larger and become more diversified. These changes increase the complexity of the information with which managers need to deal with on a daily basis and the risk of information overload becomes real (Hedelin & Allwood 2002). These changes increase the importance of adopting IT and DM as tools to facilitate information handling and decision making. In the next section, the issue of NMS is reviewed with particular focus to the interaction between IT, DM and management styles and the role of IT can play in the development of the NMS. It is expected that overlap may occur between the two broad management styles.

3.3 The new management style

New management styles (NMS) are appearing as the nature of global competition, economic influences and increased demands from the public and business to develop the level of public services appear making it more difficult for publicly listed organisations to retain hierarchical and paper-driven organisations (Flynn 1995). As a result, the creation of strategic managerial vision seems very important. This strategic vision can enable the managers to realise opportunities and obstacles in relation to new technologies and enhance their ability to make communication and interpretation of different views within their organisations (Auer & Ruohonen 1996; Mintzberg *et al.* 2005).

Various studies have explored responses to the NMS and as a means to effectively approach new organisational situations such as the adoption of new technology like DM. Chapman (2001) argues that as a consequence of the changing nature of the organisational context, the work of managers has changed to become more flexible, horizontally integrated and decentralised, which ease the adoption of IT and DM.

Jassawalla & Sashittal (1998) classify the managerial thinking in relation to the organisational adoption of IT and, hence, DM into two major approaches. The first is based on what they called paranoid managerial thinking while the other is based on

pronoic managerial thinking (Table 3.1). They suggest the adoption of pronoic managerial thinking to assist the organisational transformation through technology transfer. This means that managerial practices have to move from mechanistic focus (the classic theories) towards an organic focus (Halal 1998). The mechanistic style is based on hierarchical supervision and formalised systems and rules of communication while the organic style is based on a network structure of control and authority.

Table 3.1: Pronoic Vs. paranoid managerial thinking: Adopted from Jassawalla & Sashittal (1998)

Paranoid thinking	Pronoic thinking
1) Anti-innovation defensive routine	1) Supportive routine through the availability of information which supports innovation and creativity.
2) Managing people is about getting people to do what is expected from them. Employees' behaviour controlled via directives, rewards and punishment.	2) Managing people is about creating an environment where they find meaning and rewards in their self-expression, personal development and growth.
3) Managers' role includes the controller of information and resources, the strategist and the decision-maker.	3) Managers' role includes an educator concerned with promoting collaboration, resources facilitators who encourage employees to be creative.

Furthermore and based on his review of the duties and skills of a manager of a learning organisation, Darwin (2000) categorises the capabilities of the new managers into seven categories, as follows.

- Leadership and vision involving building shared vision, specifying goals, stimulating motivation and commitment.

- System thinking that includes the capability to read the environment, to use the skills of remote management and to have a helicopter view that enables him/her to consider all organisational attributes and stakeholders.

- Managing complexity that is based on a tolerance of ambiguity and capability to maintain flexibility.

- Personal capability that includes personal enthusiasm, political awareness, communication and negotiating skills.

- Creativity which includes the abilities to experiment, to use mental models, to promote creativity, learning and innovation.

- Team working that involves the ability to collaborate, to build teams, to sell ideas to others and to influence them.

- Networking that includes interaction with others and developing integrated reality.

He also identifies other abilities such as the ability to accept unpredictability and recognising complexity in relation to strategy formation in complex situations. However, according to Darwin, the necessity for these capabilities should not be based on rejection of the traditional ones. In contrast, the new capabilities should be seen as an extension of the traditional management approaches.

Brookfield (2000) argued that the development of competent work practices or change to existing practices in bureaucratic organisational structures needs managers who are able to influence human behaviour. Non-numerical approaches such as persuasion, motivation, cajoling and trust building are appropriate approaches to achieving this. Other possible implications and changes for management of the publicly listed organisations that may affect the adoption of IT and DM include changing the structure

of publicly listed organisations into more decentralised and localised services where both policy-making and service delivery are combined.

Other researchers have investigated the impact of IT adoption such as DM on managerial work as a way to formulate management response and identify the new shape that management should take (Piercy 1984; Willcocks & Mason 1988; Lu & Wang 1997; Jassawalla & Sashittal 1998; Kaarst-Brown & Robey 1999). For example, Willcocks and Mason (1988) claim that serious and fundamental problems remain and begin further back, from managers' limited visions and understandings of what new technology such as DM can accomplish and their negative attitudes towards the use of IT and DM. Other writers (Orlikowski & Baroudi 1991; Cash *et al.* 1994) try to explain the effect of IT on the traditional managerial functions such as planning, directing, controlling, organising and decision making and the need for NMS, which considers this impact. Lu and Wang (1997), who look into the diffusion of management information systems in Taiwan, went beyond this debate and seek to identify different managerial styles according to each stage of the IT adoption process. In their investigation of the relationships between management styles, user participation and system success over different management information system's growth stages, they found that different stages of management information system growth require different management styles. Therefore, managers should be adaptable and flexible according to the needs of each stage. Six stages were distinguished by Lu and Wang (1997) (initiation, contagion, control, integration, data and maturity stage). They claim that management styles required to encourage user participation and achieve system success range from people orientated style to task orientated style. It would appear difficult to change managerial behaviour from one stage to another and this was not clarified in this study.

NMS assumes that the use of IT within organisations has changed the traditional role of management from controlling and organising to facilitating and developing (Kakabadse & Kouzmin 1996). However, these studies and many others share a central assumption, which deals with IT as something taken for granted where all other organisational

factors including management should be changed to match it. Writers such as Preece (1995) raise this issue when they classify the major organisational theories (school of thoughts) in relation to IT adoption into two perspectives.

- The technological determinist school of thought, which views IT as the single most significant factor in determining the success of an organisation.

- The social action approach which considers IT as enabler rather than determinist. Factors like management, social environment and culture play very significant roles and should be first considered and analysed.

The first perspective does not reflect other organisational inputs and views IT as a magical tool that solves all organisational problems and ignores all other organisational components. This can lead to the failure of IT and DM adoption since no supportive organisational mechanism is put in place.

This research adopts the second perspective which, on the whole, seems more appropriate, as interactions between IT, DM and organisational components are considered. This provides an appropriate and complementary environment which supports the process of IT and DM adoption. Accordingly, technology should be designed to support the successful organisational and managerial practices in addition to modifying or changing inappropriate ones. In addition, organisations need to establish a business driven strategy to achieve a coherent IT and DM adoption. This requires understanding of the organisational context and the nature of interaction between IT, DM and the components of this context including management.

Another key issue which must be noted regarding the management literature is that most of it has been developed within the context of developed countries and disseminated all over the world to explain and organise the management practices and work. However, due to the economic, political, and managerial differences among these countries, the adoption of the results of these studies may not be reliable and accurate. Identifying the

management characteristics must be based on empirical investigation which involves real intervention in order to attain rich background concerning the current managerial approaches in the organisations of developing countries. With the absence of empirical evidence concerning the dominant managerial style/s within the organisations of developing countries and the potential interaction between IT, DM and organisational management, the formation of IT strategy or any other organisational strategy will be misleading and may cause an expensive failure. Nonetheless, the rich managerial literature in developed countries can provide a basic managerial knowledge that can enhance the exploration of managerial thinking within the developing countries.

Based on this, some writers have devoted some efforts to explore the issue of management and IT in developing countries. In the next section, these efforts are discussed in some details. This can provide theoretical foundation and clarify how far the management practices in developing countries are from the new perspectives discussed above. More interest is given to Arab countries' context. This can enable the identification of any difference and provides closer image concerning the research particular context.

3.4 Management styles in developing countries

The transfer of management theories that have been developed in USA and Western Europe to developing countries is particularly suspecting (Law 2003). Hofstede (1984; Hofstede 1994), who studied cultural and social differences in fifty countries and three regions in the world, argues that these differences make the applicability of most management or organisational theories of developed countries unacceptable and do not make any contribution to the context of developing countries. Thus, the impact of national culture dominated in any country must be explicitly considered for effective managerial practices and effective operations of organisations. The origin of this proposition lies on the fact that the environment where an individual lives and works has a significant impact on the values, beliefs, and attitudes that determine the individual

behaviour whether this individual is a manager or employee within any organisational context.

A number of researchers (e.g., Zeffane & Rugimbana 1995; Kirlidog 1996; Youssef 1996; Heeks & Stanforth 2007) have examined managerial issues in developing countries. Youssef (1996) looked into the process of public sector reform in Egypt. He found that public sector reform is likely to be a major focus of policy development in developing countries often directed to addressing inept bureaucracies. Major change in the sector's role, structure and behaviour is usually identified. While public sector organisations of developed countries tend to be sensible, effective and more professional, the dominant forms of organisational behaviour in developing countries are bureaucratic, traditional and rely to a great extent on social order (Top-down management approach) in addition to some cultural, economic and religious factors that affect management and organisations (Zeffane & Rugimbana 1995).

Furthermore, Polidano (1999) notes the lack of expertise, unreliability of information systems and the existence of a sharp dichotomy between formal and informal rules in the organisations in developing countries act to prevent the successful introduction of management reform. The rapidly changing technological environment creates greater challenge for developing countries as compared to developed countries because:

> *Developing countries start from a position of weakness, based on low levels of investment in information infrastructure, lack of public interest in modern information facilities and dependence on the multinational corporations (Zeffane & Rugimbana 1995, p. 31).*

Zeffane & Rugimbana (1995) also indicate that understanding and managing IT tools and realising their impact is more crucial for developing countries than developed countries because of the scarcity of resources and the importance of getting as much benefit as possible from implementing such technologies. In addition, Zeffane & Rugimbana (1995) mentioned that strengthening the management capacity is one of the most important tasks to achieve successful utilisation of new technologies in developing

countries. They argue that management in developing countries must understand that the process of IT and DM adoption requires organisational change and user participation in this process.

A number of researchers (Hofstede 1984; Hofstede 1994; Kirlidog 1996; Daft 1998) have commented on the relevance of the literature based in developed countries to developing countries. They have argued that the individualistic nature of western societies focused on individual interests and accomplishments more than group ones (collectivism) makes the value of managerial or organisational theories developed in these societies more limited and sometimes lead the analysts to confusion. While some issues like kinship and personal relationships play an important role in the organisation of group-orientated societies (e.g., nepotism), they have no role to play in western societies (Zeffane & Rugimbana 1995). Hunt and At-Twaijri (1996) support this argument claiming that Saudi managers give priority to friendships and personal considerations over organisational goals and performance. However, the strength of the group within Arab collectivist culture can support the utilisation of team work and team management. Social relations between organisational members are expected to have a considerable effect on the individual perception of IT and DM applications and, thus, can be, if used effectively, an assistant for organisational change. Therefore, the development of research practices that look at these attributes is necessary in understanding the nature of management in developing countries. This is presented in the next section which provides a review of Arab management literature.

3.4.1 Management styles in Arab countries

Arab management has been relatively little studied until recently. Many textbooks in the field of management have not recognised the existence of the Arab world at all (Weir & BP 2000). Atiyyah (1992) suggests that favouritism, nepotism and personal connections have a significant impact on management processes in Arab countries. He argues that cultural factors such as strong kinship and family ties are frequently blamed for these negative practices. Factors like the extended family, tribe, clan and Islamic religion play

an important role in community life and interpersonal relationships in Arab countries. Therefore, family ties and ideological affiliation, rather than practical or academic qualifications, significantly affect managers' recruitment and promotion decisions (Almehdl 1998). Agnaia & Gherian (1997, p. 117) states that:

> *The difficulties that face Arab organisations regarding the management training and development programs result from the characteristics of Arab managers which concentrate on seniority rather than merit, on centralisation rather than decentralisation, on nepotism rather than fairness, etc.*

Atiyyah (1992), based on his review of a number of Arabic studies, recognised two dominant management styles in Arab countries. The first is the authoritarian management style; called top-down managers or micro-managers, in this style, staff are expected to do what they are told and generally there is little room for dispute or negotiation. The second is the consultative style, which is connected to the Islamic and tribal values that support consultation. Atiyyah (1992) finds that Arab management styles in general are culture bound. A clear example of this, as he argues, is the low priority assigned by Arab managers to planning, which is related to the strong fatalistic attitudes in Arab culture. According to Atiyyah (1992), organisations in Arab countries are based on control and acquiescence with rules and regulations. This rigid bureaucratic system, as he points out, has shown strong resistance to the introduction of modern management and organisational methods and techniques. Although his study points to the diversity of management styles through the existence of authoritarian and consultative management styles, it gives a negative view concerning Arab management. Regarding the timing of this study and the technological and organisational change that has taken place in recent years this view is no longer particularly persuading.

Ali and Camp (1995), in their evaluation of Arab management education, argue that Arab management education has three problems: unprecedented growth, poor quality and lack of vision. Accordingly, they indicate that most management education programmes are inadequate to meet the requirements of contemporary business practice and the needs of a new generation. They showed that most of the management teaching

in the Arab world is a translation of American management theories, which are unsuitable for the Arab culture. Their review of management curriculum in eight Arab universities brings out that none of them provides a course on management culture or environment in the Arab world.

Yousef (1998) studies the role of organisational culture and level of technology used in the organisation as predictors of decision-making styles in the United Arab Emirates. He shows that these aspects, in addition to the decision-makers education and management levels, are good predictors of decisions-making styles in that country circumstance. He also hints that the participative style of management persists among young, middle and highly educated Arab managers. The decision-making styles that were represented in his study are autocratic, pseudo-consultative, consultative, participative and delegatory styles. Although this study gives useful insights towards understanding Arab management, one statement was used to evaluate each style and is based on self-report classification which decreases the external strength and reliability of the findings of this study.

In seeking for a more comprehensive understanding of the nature of Arab management, Elgamal (2000), based on his theoretical review of Arab management literature, suggests a theoretical paradigm to understand Arab management. His paradigm is based on his understanding of the major sources of Arab management that consider the Islamic religion, Arab culture, the westernisation effect, in addition to the political, economical and social systems in the Arab world. He determines four major problems that prevent managerial and organisational development in the Arab world as follows (Elgamal 2000, p. 111).

- The discontinuity of management development plans and the absence of well designed and articulated plans for the short, medium and long terms.
- The conflict between traditional and modern practices which leads to ineffective use of organisational resources.

- The dominance of individual -based loyalties and relationships that have a greater impact on organisational behaviour than organisation based relationships.
- The absence of integrated management and organisation systems that provide a clear explanation of job description, performance evaluation methods, training and development requirements.

It is noted that most of the above studies have used Islamic and cultural values to explain some negative practices of Arab managers. However, these negative practices are not an integral part of Islam in Arab culture. Misinterpretation and ineffective use of these values by some managers has lead to this misconception. In supporting this, Ali (1992; Ali 1996) examined the powers that shape the direction of Arab management and distinguish some significant variables that affect Arab management thought. He indicates that cultural discontinuity is possibly the most significant factor that prevents the development of Arab management. Therefore, he argues that the available studies focusing on Arab management have shown that the current management styles prevailing in Arab organisations have been subject to external effects and lost attachment to Arab cultural heritages and principles. Moreover, he stressed a strong commitment between Arab managers and Islamic work ethics. This commitment underlines that justice and generosity in the work-place are essential conditions for society's welfare. Implications for this commitment include management understanding for human requirements that are essential to accomplish any suggested development, the value of social skills and effective public relations to the success of any change and the value of organisational change that are lead towards serving the whole community. These implications represent some well-established cultural standards in Islamic societies which can be seen as the basic components of Islamic management that is set by the Quran (the holy book of Muslims) and "Sonah" (the life of Mohammad). One can indicates that the above implications impose certain positive management styles and contribute to the styles of management that dominate Arab organisations.

In fact, the few available studies and the fragmented research related to Arab management have been carried on through a comparatively simplistic and descriptive approach in terms of the methodological approaches used and the findings that have been brought out (Ali 1996). Cultural values of Arab societies were underestimated and hardly considered (Ali 1992; Ali 1996). In addition, several studies (Atiyyah 1992; Elgamal 2000; Weir & BP 2000) were built on a theoretical review and lack the empirical evidence concerning the nature of Arab management. In addition, most of these studies have dealt with one dimension related to managerial work while there is a necessity to analyse the impact of managerial dimension itself on other organisational issues including IT and DM adoption. Accordingly, management development activities in Arab countries are disappointed and surrounded by a combination of misconceptions regarding its nature and needs as well as interference by some socio-cultural elements (Al-Shammari 2000). One can also mention a contradiction between cultural and Islamic values regarding the styles of Arab management. This can be an effect of ignoring and sometimes misbehaving of Islamic values by Arab managers. A possible explanation is the lack of management studies that adopt multiple views in dealing with Arab management as a mixture of Islamic and cultural values that are exposed to external effects which may positively or negatively change the practice of Arab managers.

Finally, looking at technology as a change agent proposes up-dating the management styles literature to suit IT and DM adoption as a new driving force in the organisational environment. The research of management styles and their correlations with managers' attitudes towards IT and DM is expected to provide new insights as such connection has not been made in the previous literature. According to Heirs & Farrell (1986), the increasing number of potential social, political, commercial, environmental and legal consequences linked with any significant management decision and the rising complexity of the information combined with the ever-increasing rate of change make it essential to re-think entirely the management priorities. In this perspective of the argument, the interaction between management styles and IT and DM adoption should have greater attention. In this research, this will be studied through analysis of

management styles and their attitudes towards IT and DM determining any possible changes in the last few years through analysing the extracted styles of management with the previous literature leading to determination of the relationship between management styles and managers' attitudes towards IT and DM adoption.

3.5 Conclusion

Previous literature classified management styles somewhere between task-centred and people-centred style. The earlier management schools placed in the one of the two styles. For example, scientific management school is concerned with the achievement of the organisational tasks and the ignorance of employees' interests. While human centred management gave priority to human relations and communication in organisations. Recent management theories have explained other styles that range between authoritarian and autocratic styles (task-centred) to participative and consultative styles (people-centred). The characteristics of the NMS have been recognised based on some studies that have been conducted within the developed countries and have considered the development information communication technologies as a driving force for the emergence of these characteristics.

In this chapter, the rejection of well established, tested and possibly common managerial characteristics seems impractical. Nevertheless, the general framework that determines the managers' thinking in relation to managing people may be modified to allow planned and innovative change to be proposed. This framework includes changing elements of both traditional and NMS and thus implies the diversity of managerial approaches. Although some key organisational elements like employees and management as well as key organisational functions like planning, controlling organising and directing have been substantially changed, they were and will remain the core interest of the two styles of managerial thinking which makes the separation of them unachievable.

Concerning the Arab environment, the appropriateness of Arab management characteristics for IT and DM adoption has not been widely investigated in the available

literature. Most of the available studies have provided negative view regarding the nature of Arab management styles which makes Arab management more relevant to traditional style of management. Accordingly, this chapter emphasises the importance of studying, is some depth, the management in Arab countries.

For this purpose, this research will look into the characteristics of Arab management and will propose a two dimension-model as a general framework in which this research is conducted including task-centred and people-centred management styles.

As the above review of the management literature has shown the absence of an ideal management style and the overlap between different styles of management, another research question was proposed to fill the existed gap in the literature regarding Arab management styles in general and Jordanian publicly listed organisations in particular.

- *What management styles dominate publicly listed companies in Jordan?*

The next chapter will discuss the attitude towards IT and DM and its correlations with management styles as well as some demographic characteristics that are explored in this study. Attitude towards IT is selected as an intermediary factor to evaluate the relationship between management styles and IT and DM adoption.

4 Attitude towards IT and DM (Management point of view)

4.1 Introduction

In this chapter the relationship between managers' attitudes and demographic characteristics (age, gender, educational level, non-IT organisational experience and span of control) will be discussed. This review leads to the identification of research questions related to managers' attitudes towards the adoption of DM and the effect of selected demographic characteristics on these attitudes. The conceptual framework adopted in this research is then explored.

4.2 The importance of attitudes

Attitudes toward IT and DM can be viewed as multidimensional in nature and reflect the general acceptance of new ideas, a risk-taking propensity and/or a preference for innovation (Gallivan *et al.* 2003).

The available literature in relation to the attitude of individuals towards IT is divided into two main themes. The first theme divides attitude into three major components, the cognitive, affective and behavioural components (Reece & Gable 1982; Schutt 1996; Venkatesh *et al.* 2003; Kwon & Vogt 2010). The cognitive component is what a person conceives about the object, whether true or not. The affective component is the belief that an individual has about the object, which will shape his or her judgment of this particular object. The behavioural component is reflective of the actual behaviour of the individual in relation to this object. Consideration of these three components and the correlation between them are important. For instance, cognitive and affective components can decide actual behaviour when people are free to act. In addition, having a positive attitude towards IT may not be enough to lead people's behaviour towards using IT tools such as DM. Other factors like IT literacy and the availability of IT tools

have a significant relationship with IT use (Gallivan *et al.* 2003). It would seem that IT and DM adoption studies suggest that people are not seen as a significant part of this process (Green & Salkind 2002; Dunham 2006). In such cases, the value of actual behaviour or the behavioural components of their attitudes is overestimated, while the cognitive and affective components of their attitudes are underestimated or not considered at all. In the long term, ignorance of both cognitive and affective components will negatively affect actual behaviour and may create a resistant behavioural patterns regarding DM implementation.

The second theme deals with attitude in connection with liking, anxiety, confidence, and usefulness of a particular object (Loyd & Gressard 1984; Loyd & Loyd 1985; Francis 1994; Saeed & Abdinnour-Helm 2008). The emergent of this theme can be seen as an attempt to show the value of cognitive and effective components of attitudes. Therefore, one can argue that this theme complements the first theme which, as mentioned earlier, focuses on the behavioural component of attitudes.

This research will adopt the second theme in dealing with attitude. This decision is based on the assumption that attitudes of individuals towards a particular object reflect their feelings and beliefs concerning this object. The realisation of these attributes can justify the individual's motivation concerning a specific behaviour towards a specific object. In other words, the first theme is embedded in the second theme which affords clearer representation of emotional and intellectual perception of individuals towards IT, which make them either resist or accept and encourage the use of DM.

People may resist the introduction of IT, DM and any other proposed change because they think that this change may affect their economic, social, and personal needs (Harrison & Leitch 2000). Changing the existing system of procedures may also create doubt concerning the future courses and activities. Pheng (1999) reported other reasons that make people in general resistant to change. Among these reasons are: habits and complexity avoidance behaviour, security (safe old way), fear of unknown (uncertainty avoidance), and selective information processing behaviour.

Some forms of reaction to change including IT and DM use as reported by Bell & Harrison (1987, p. 292) include:

- Aggression by people who see it as being a way of cutting cost or getting more work out of them.
- Apathy from people who think nothing they say matters anyway.
- Uncooperativeness from people who feel inadequate and are afraid they may not be able to cope with the new system of procedures or may lose their jobs.
- Enthusiasm from positive people who see change as a chance to widen their experience and improve their career prospects.

Exploration of these possible reactions is important to increase the probability of receiving the desired outcomes. Any undesirable reaction can be eliminated with top management support, employee-manager participation, open communication systems and supportive rewarding system (Pheng 1999). The ways in which the resistance of employees towards a new system such as DM can be decreased would appear to be highly related to the style of management prevailing within the organisation where a new system or change is being placed. So it is important to identify ways to reduce and/or minimise resistance to change. This makes the investigation of correlation between management styles and attitudes towards IT and DM meaningful.

Based upon the theory of reasoned action, Kolekofski & Heminger (2003) study the effect of employees' beliefs and attitudes about sharing organisational information showed that the role of attitudes in the process of sharing information is more complicated than first identified by previous studies. Understanding and taking into account these beliefs and attitudes provide a variable and reliable source which is important to take into account in addressing the formation of IT and DM adoption strategies. Considering the social environment where an individual behaves and the cited benefits of the attitude object, one can argue that attitudes can act as a predictor of people's reaction and their behaviour. The context of a specific object has several

elements and each of them will have an influence on the individual's behaviour. Thus, an individual's attitudes are best seen as facilitative causes for a particular behaviour (Moon & Kim 2001). Given the pervasiveness of IT use in today's world, it is expected that people have developed some attitudes towards IT and DM. Intentions and reactions of people concerning IT applications such as DM should be well identified (Shaft *et al.* 2004) which is one of the major concerns of this research.

4.3 Individual's attitude towards information technology and data mining

In his review about the factors that affect an individual's attitude towards new technology, Bill (1997) indicates that the formation of attitudes towards IT is affected by several factors. Amongst these factors are: the system of beliefs and values that shape the organisation, age, gender and cognitive ability. In general, Bill (1997) indicates that younger people are more likely to have positive attitudes than their older counterparts. He also found that most studies have found that males tend to show more positive attitudes towards IT than females regardless of their level of technological familiarity. On the other hand, female attitudes become more positive as the level of familiarity increases. Because of the challenging nature of technology, he found that low cognitive ability leads to negative attitudes towards IT. Accordingly, a better understanding of these factors may give a basis for improving the way in which IT and DM are adopted in organisations (Avgerou 2008).

The value of this understanding is driven from the fact that people's response to IT differs according to the implications of IT implementation on their work activities and personal circumstances in their organisations. Several IT implications for employees and managers have been distinguished in the literature. Some of these implications have a negative influence on employees and/ or managers such as lower staff numbers, reduction in employees' privacy and social isolation. Other implications can lead to improved working conditions, more flexibility, and increases in employees' autonomy (Brynjolfsson & Hitt 2003). Understanding the internal characteristics of the organisation prior to the DM adoption process can lead to increases in the effectiveness of any

potential strategy for DM adoption. Deciding the most successful adoption strategy requires a comprehensive understanding of organisational members' thinking and their attitudes towards working with or learning about the new technology such as DM. Several questions can be raised concerning these implications:

- How are individuals within the organisations expected to react to these implications?
- What are the bases for the different responses that might be indicated?

These questions, among others, form the basis of this research.

Cukier & Middleton (1996) argued that managers' attitudes towards the application of IT such as DM within their organisations depended upon their own perception regarding the benefits or drawbacks of IT on their own work activities. These differ from one manager to another depending on the manager's own view. The classification of managers according to their demographic characteristics can provide a valid source of information to develop organisational policies that consider all differences.

In order to classify managers according to their demographic characteristics within this research context, five relevant demographic characteristics will be identified after consideration of the available literature, including gender, age, educational level, organisational experience and span of control. These aspects will be used to classify the managers of Jordanian publicly listed companies into several segments. Exploration of the relationships between these characteristics and attitudes of managers towards IT and DM is expected to provide a valuable source of data for strategy formation process. The next section provides an overview of these relationships as presented in the previous literature and proposes some research questions to: first, revalidate the findings of previous studies and then to explore these relationships within the context of Jordanian publicly listed companies.

4.4 Managers' attitudes toward information technology and data mining

Lin & Chen (2000) used the socio-technical system to explain the importance of social aspects in the process of IT adoption. The socio-technical system looks at an organisation as a combination of two interdependent sub-systems. The first is the technical system, which focuses on equipment, processes and technology. The second is the social system, which concentrated on people perspectives and relationships within the organisation. Their study reached a number of relevant conclusions. Management practices were found to explain about 24.1% of the success of IT adoption. Social factors and managerial factors combined were found to explain 35.3% of the variance of the success of IT adoption. Consequently, investigation of managers' perceptions in relation to IT and DM adoption is important and should not be underestimated.

Hanna *et al.* (1995) investigated the experience of a number of developed countries such as Canada, Germany, Ireland, the Netherlands, Sweden, the United Kingdom, the United States and Japan and argue that managers in developing countries are likely to resist imperatives such as information sharing and decentralised decision-making and this may affect the IT adoption within these countries. However, some factors, such as "technological culturation"-which can be defined as the cultural influence and the experiences that individuals have with technology originally developed in other countries (Straub *et al.* 2002)- and technical training may change the managers' view of IT. A study conducted by Straub *et al.* (2002) in five Arab countries showed that a differentiation should be made between the perception of upper-level managers to IT and that perception associated with lower-level managers and workers. They argue that upper level managers usually have optimistic attitudes to IT adoption because of the process of technological "culturation" that affects them. This process may have a great effect on the adoption of IT and DM in developing countries as most upper-level managers have awarded their education from developed countries. Certainly, Arab countries in general, are not an exception. Nevertheless, the perception of lower managerial levels is expected to be more significant than the formal strategies enforced

by top management, since they are involved with the practical aspects of IT and DM adoption through holding the responsibility of the daily use of IT and DM and their continuous interaction with employees and service users. Most importantly, noting the scarcity of academic research, no one can claim that formal plans relating to computer applications that are developed by upper-level managers reflect the whole reality which should be based on the people who work or will be working with IT and DM. For that reason, this study can provide a valuable contribution through the exploration of the lower and middle line managers' attitudes towards IT and DM and whether the attitudes of managers towards IT and DM as a dependent variable are influenced by their styles of management. Based on this, the following question was proposed.

- *Is there a significant relationship between managers' attitudes towards IT and DM and their styles of management?*

4.5 Demographic characteristics

Gender

Research suggests that attitudes toward IT differ between the genders. Males tend to show more positives attitudes toward IT, regardless of the level of familiarity, while female attitudes become more positive as the level of familiarity increases (Schumacher & Morahan-Martin 2001). Igbaria & Chidambaram (1997) investigate the effect of gender on the use of IT; they propose that substantial gender differences exist. For instance, women were found, on average, to be somewhat younger and less experienced than men with lower salaries and fewer opportunities to interact with people outside their departmental boundaries. Thomas (1996) examined the low representation of females in computer studies, programming, and other IT-related courses; he concludes that males and females process information differently and that males have greater analytical and quantitative skills than females. Thus, he concludes that computer anxiety is more often associated with females. Forster (2000) argues that new communication technologies may be a powerful ally for women in organisations since the work of organisations will

more and more rely on brainpower. As a result, traditional barriers between men and women in organisations will be reduced. Kay (1992) studies the methods used to investigate gender differences in computer-related behaviour and revealed that of the ninety-eight studies of attitude measurements, researchers found that forty eight studies showed males do have more positive attitudes toward IT; in fourteen occasions, females were found to have more positive attitudes; in the remaining thirty-six studies, no differences were reported. The observed contradiction concerning the relationship between IT and gender implies the need for further analysis and narrower classification of attitudes.

The rareness of IT-related studies in the Arab countries is a major issue. However, in Arab society men tend to be more active in terms of their social life than women. This may create some differences in relation to their perception of IT and DM use in general because men are more exposed to IT and DM discussions and usage. However, the use of some simple computer applications by women for secretarial work may bridge this divide and create favourable attitudes towards more advanced computer applications such as DM. Based on this; the following research question was proposed.

- *Are there significant differences between male and female managers regarding their attitudes towards IT and DM?*

Age and organisational experience

Gardner *et al.* (1993) identified a positive correlation between experiences with IT and computers and beliefs towards them, negative experiences with IT correlated with negative beliefs and attitudes toward the technology. Accordingly, individuals that had positive experiences also espoused positive beliefs and attitudes. According to Thomas (1996) inexperienced users are expected to view IT as impersonal, unapproachable, complex, or dull, and require a high level of technical skills and computer knowledge to use it. Carnoy (1997) indicated that computer literacy can reduce resistance to the adoption of new technology. Therefore, older and more experienced managers are more

likely to face IT literacy problems that make them resist the use of IT (Carnoy 1997). Some writers suggested a link between experience, age and IT literacy, claiming that older managers may fail to match the technical requirements of IT adoption such as possessing a sufficient IT literacy (Kaul 1997; Bennett & Muraleedharan 2000; Kakabadse *et al.* 2003). Accordingly, those managers will expect to be displaced by younger and technically experienced workers (Jasperson *et al.* 2005).

On the basis of the above discussion, the following research questions were proposed.

- *Is age influential in the attitudes of managers towards IT and DM?*
- *Is the length of work experience influential in the attitudes of managers towards IT and DM?*

Education level

Another significant characteristic that may affect managers' attitudes towards IT and DM is the level of education. Prior research has shown that individuals having more years of formal educations are expected to adopt new technologies earlier than the ones who have less (Rogers 1995; Hong & Kim 2002). However, level of education is more dominant in developing countries where people have fewer opportunities to experience higher education, due to the difficult financial circumstances and high educational fees. The situation is different in developed countries where education is more widely available and at affordable cost. This, in turn, may create major differences between countries in relation to the impact of both age and educational level on the IT and DM adoption. Thus, it is not a surprise that some studies conducted in some developed countries (e.g. (Tabak & Barr 1999) have found no significant relationships between education level or age and intentions to adopt innovations. To investigate this issue within the context of Jordanian publicly listed companies, the following research question was proposed.

- *Is there any significant relationship between the manager's level of education and his/her attitude towards IT and DM?*

Span of control

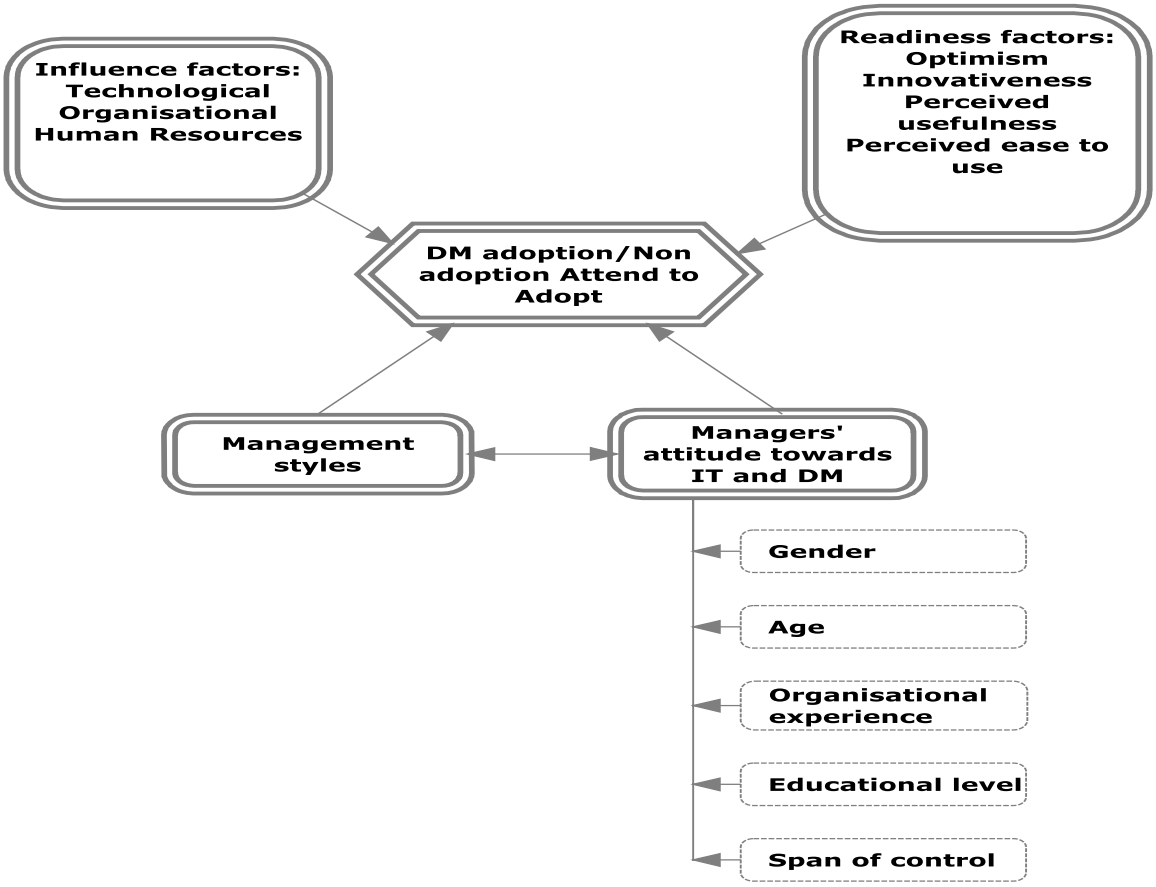
Span of control refers to how relations are structured between leaders and subordinates in an organisation. A wide span of control exists when a manager supervises many subordinates and a narrow span of control exists when a manager supervises few subordinates. Thus, a wide span of control is seen as an important source of information and knowledge, including technical knowledge and this, in turn, may encourage managers to follow certain behaviours regarding all organisational aspects, including any potential IT and DM adoption (Hill & Hoskisson 1987; Topp & Desjardins 2011). Accordingly, this research is seen as an opportunity to draw attention to this issue, which it appears has not received any attention in previous studies. For this reason and in order to investigate this issue, the following research question was proposed.

- *Is there any significant relationship between the manager's span of control and his/her attitudes towards IT and DM?*

4.6 Conceptual Framework

Based on the review of literature presented in the last three chapters and the research questions that have been proposed, figure 4.1 shows the research conceptual framework.

Figure 4.1: Research conceptual framework



This model aims to assess associations between demographic characteristics and managers' attitudes towards IT and DM. It also suggests a possible relationship between managers' attitudes towards IT and DM and their style of management.

4.7 Summary

This chapter provided a review of the attitude of managers toward IT and DM and the possible effect of demographic characteristics on these attitudes. Most studies have been carried in developed countries with few s having considered these issues from the perspective of a developing country.

5 Research Methodology

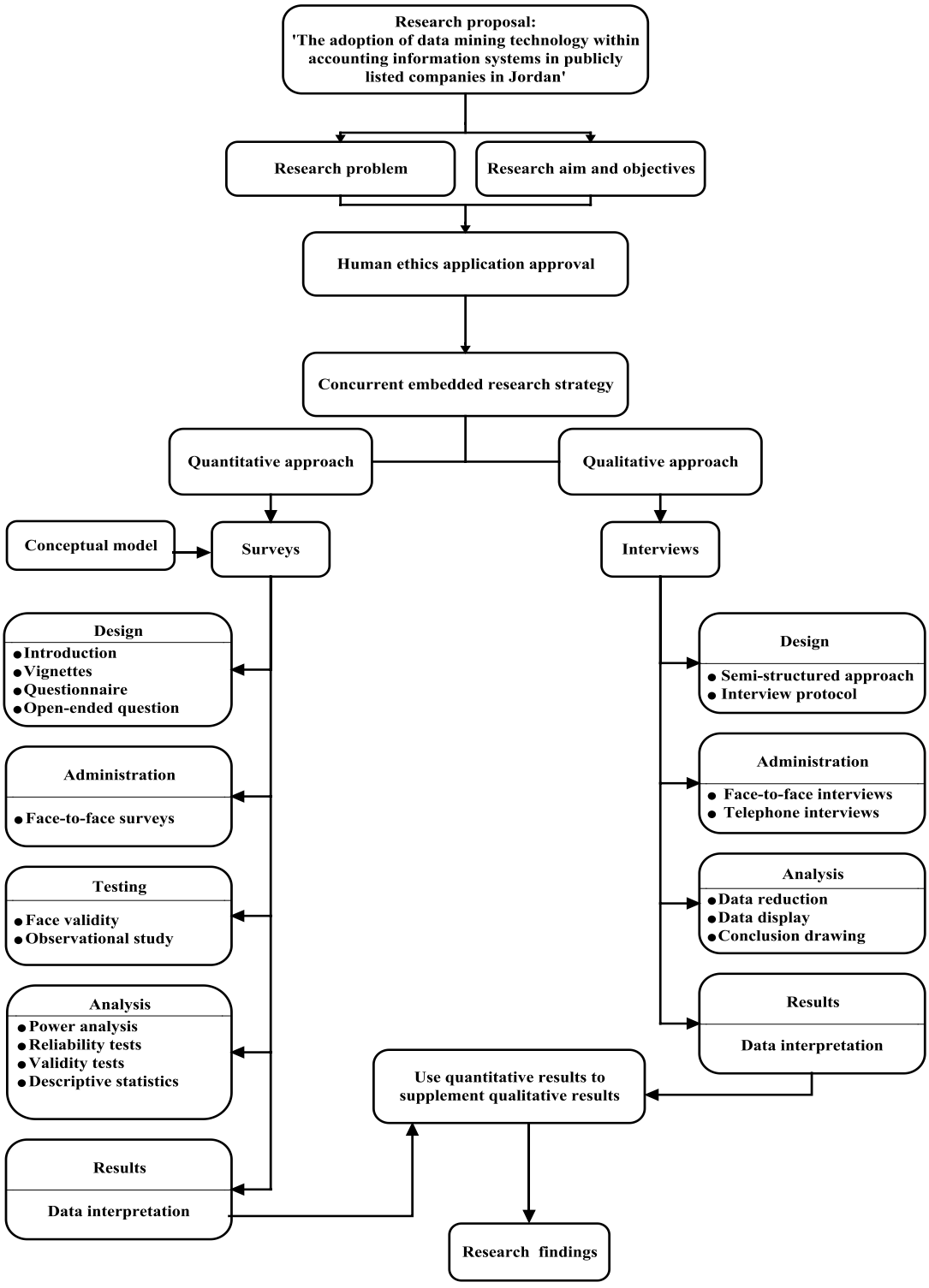
5.1 Introduction

In this study a mixed methodology approach was adopted combining quantitative and qualitative methodologies. A survey was used to assess managers' attitudes towards the adoption of DM, as well as to identify the relationship between these attitudes and management styles within the context of publicly listed companies. Qualitative interviews were subsequently utilised to enrich the survey data and explore a number of issues raised by the survey responses.

5.2 Research design

The research design chosen is appropriate to the subject investigated. It is consistent with the objectives of the study and it is felt that the procedures adopted in data collection are appropriate to obtain answers to the research questions posed (Cooper *et al.* 2003). The sequence of the research process follows what Creswell (2009) defines as "sequential procedures, in which the researcher seeks to elaborate on or expand the findings of one method with another method". Creswell (2009) also states that the study may begin with a quantitative method in which theories or concepts are tested, to be followed by a qualitative method involving detailed exploration of a few cases or individuals. This research started by collecting and evaluating research literature, followed by development of a quantitative survey instrument to test the relationship between the variables. Finally, qualitative interviews were conducted to elaborate and to refine the quantitative results. The structure of the research design adopted is illustrated in Figure 5.1. Different stages in the research design are explained and justified throughout this chapter.

Figure 5.1: The structure of the research design



5.3 Research philosophy

Arbnor & Bjerke (2008) described a number of closely related factors that shape the methods used by researchers to create knowledge. Among these factors are the researcher's background assumptions, beliefs, and paradigms. They described a paradigm as including such notions as one's conceptions of reality, science, and scientific ideals, as well as one's sense of ethics and aesthetics. Kuhn (1996) and Arbnor & Bjerke (2008) have provided two significantly different views of paradigm formation in the social sciences. Kuhn first discussed how various natural science paradigms emerged, beginning with mathematics and astronomy, Information Quality Strategy continuing through more recently developed scientific fields such as motion, heat, historical geology, and biology, and then stated, "It remains an open question what parts of social science have yet acquired such paradigms at all" (Kuhn 1996, p. 15). Arbnor & Bjerke (2008), on the other hand, stated, "We (and many others) have found Kuhn's type of analysis rewarding at the same time that we note an important difference between the natural and social sciences. In the natural sciences, old paradigms are replaced by new ones; in the social sciences, old paradigms usually survive alongside new ones" (Arbnor & Bjerke 2008, p. 13).

The DM adoption literature exemplifies the notion that multiple paradigms can and do survive alongside one another. Research on the topic spans multiple paradigms and includes the use of a wide assortment of methodological approaches, depending on the research question under consideration. As such, within the DM adoption field, the ability for an individual researcher to flexibly select from among multiple paradigms and multiple methodologies is seen as advantageous. This ability fits well within what Greene *et al.* (2005) referred to as the "pragmatic stance" (p. 275), which they described as "an inclusive philosophical framework within which multiple assumptions and diverse methods can comfortably reside" (Greene *et al.* 2005, p. 275).

Traditionally, positivist, post-positivist, interpretivist and critical are the common paradigms that have usually been adopted in IT and DM adoption research (Orlikowski

& Baroudi 1991; Klein & Myers 2001). Although these paradigms are different, in practice the differences are not so clear where the results of one paradigm tend to get mixed or integrated with the results of other paradigms (Myers & Avison 2002; Neuman 2003). Therefore, combining several paradigms is a common practice within IT and DM adoption research (Klein & Myers 2001; Mingers 2001).

5.4 The paradigms adopted in this study

This study was not dominated by a single paradigm- the post-positivist and the interpretivist paradigms were selected to justify the aim of this study and attain all of its objectives. A review of each adopted paradigm is discussed followed by their application to this study.

5.4.1 Post-positivism paradigm

Some of the underlying assumptions of the positivist paradigm have led IT and DM researchers to question the efforts to force social science methods to conform to natural science expectations (Hirschheim 1992; VanderStoep & Johnston 2009). As a result, the positivist paradigm has been subject to a number of criticisms. For example, several researchers argue that the paradigm is unsuitable for IT and DM research since it does not have an established and intrinsically related body of theory to draw from and often needs to co-opt a theory from a 'reference discipline' such as organisational behaviour, management accounting or computer science(Clarke 2000; Tootell 2007). In addition, the paradigm generally lacks the vision to intensely explain social reality since reality is a complex, composite and multi-dimensional phenomenon that is not easily or completely amenable to statistical deduction (Perry *et al.* 1997).

In response to a growing critique of the positivist paradigm, a post-positivism movement emerged as an answer to the problematic issues of the positivist paradigm (Guba & Lincoln 1994). Onwuegbuzie (2002) even denoted this emergence as the start of more radical paradigms such as interpretivism, constructivism and naturalism. Post-

positivism provides an alternative to the traditions and foundations of positivism for conducting disciplined inquiry. For the post-positivist researcher reality is not a rigid thing, instead it is a creation of those individuals involved in the research. Reality does not exist within a vacuum, its composition is influenced by its context, and many constructions of reality are therefore possible (Snape & Spencer 2003).

The post-positivism paradigm provides for many of the aspects of positivism but tries to relent the strict line attributed to the positivist approach (Neuman 2003). Researchers under this paradigm, although still assuming objective reality, postulate it as "approximate" that is apprehended only imperfectly and, therefore, open to several interpretations or explanations (Guba & Lincoln 1994). In the world of post-positivism, a researcher's perception is neither right nor wrong; it is just different from other perceptions (VanderStoep & Johnston 2009). Post-positivists see themselves as data collection instruments that are inevitably influenced by the values of the researcher and his or her gender, personality, ethnicity, nationality, culture, religion, family and attitude (Onwuegbuzie 2002; VanderStoep & Johnston 2009). Accordingly, even when post-positivists strive for objectivity in relation to the phenomena they are investigating, they believe it is impossible for a researcher to be totally objective in his or her observation of the data (Hatch 2002).

Similar to positivists, post-positivists seek generalisation to explain human behaviour, but they persist on explaining how and why individual differences between humans occur (Schulze 2003). Researchers under this paradigm are usually interested in capturing different participants' perspectives in rigorously disciplined ways. However, because all measurements are fallible, since each measure introduces its own types of errors, a combination of methodologies in the study of the same phenomenon across multiple measures or observations is usually needed in order to obtain more accurate understanding (Hatch 2002; Onwuegbuzie 2002; Trochim 2006). Post-positivism is a paradigm that stresses objectivity when combining multiple methods that represent

multiple perspectives while, at the same time, concedes the probability of bias in the research itself (Guba & Lincoln 1994; Trochim 2006).

Qualitative methods are frequently employed under this paradigm with low inference, and systematic procedures dominate data analysis processes (Hatch 2002). Nonetheless, the post-positivist paradigm tends to put more emphasis on deductive logic in which research is influenced by relevant theory (Onwuegbuzie 2002). Hence, post-positivism is a term that is usually used today to represent practicing quantitative researchers rather than qualitative purists (Phillips & Burbules 2000; Johnson & Onwuegbuzie 2004).

5.4.2 The interpretive paradigm

The interpretive paradigm attempts to understand a phenomenon through examining its context and through understanding the meanings people assign to it (Orlikowski & Baroudi 1991; Klein & Myers 2001). Researchers in the interpretive paradigm assume that reality is socially constructed but it is subjective and based on shared meanings created by experiences (Myers & Avison 2002). Whereas positivists emphasise the similarities between the objects of the social world, interpretivists recognise also the differences between them (Babbie 1998). The researcher in this paradigm is mainly interested in investigating people's different perspectives and their multiple interpretations of a phenomenon. As a result, this paradigm is highly suitable to examine a situation where the phenomenon is influencing or influenced by many factors or when several actors are involved (Clarke 2000; Myers & Avison 2002).

The growing interest in interpretivism amongst IT and DM researchers is due to continuous attempts to address complex issues related to the interaction between different information systems and social phenomena such as organisational practices or individual behaviours (Klein & Myers 2001). An interpretivist acknowledges that the problem, which he or she is researching, exists in a social context and that the most appropriate way of understanding it may not necessarily be through numbers and statistical tests (Babbie 1998). This could largely explicate the tendency of the

interpretive researcher to rely on qualitative methods instead of quantitative since the former has the ability to achieve greater explanations and reach a better understanding of the social phenomena (Putney *et al.* 1999).

5.4.3 Selection and justification of the research paradigms for this study

Hirschheim (1992) argued that information systems and information technology epistemology draws heavily from the social sciences because information systems and information technology are, fundamentally, social rather than technical systems. However, this view, which ignores the technology side of information systems and information technology research, is changing as more researchers today recognise that information systems and information technology involve also an unavoidable technical component (Parker *et al.* 1994; Burstein & Gregor 1999). Klein and Myers (1999) elucidated by arguing that gaining knowledge about reality can be achieved through exploring the shared meanings about the phenomenon of interest. In the context of this research, understanding the issues surrounding the adoption of DM technology within AIS can be achieved through exploring the management styles and management attitude toward DM. Accordingly, it is reasonable to argue that this study is predominantly of an interpretive nature.

While it is possible under the interpretive approach to explore diversity of opinion (Ragin 1989; Klein & Myers 1999), not all answers can be acquired under the interpretive approach alone since the paradigm is mainly of an exploratory inductive nature. In spite of Dreher's (1994) argument that "interpretive studies have functions that range from exploratory identification of variables to the actual testing of hypotheses" (p. 294), it is strongly argued that a combination of paradigms would serve as the best option to accomplish all the objectives of this study. Accordingly, the post-positivist paradigm is adopted, in addition to the interpretive paradigm, since it is completely justifiable under the post-positivist paradigm to explain manager's attitude toward DM technology by using relevant theories of attitude, to provide empirical and

logical evidence of the attitude and to produce results that can be generalised to other contexts as well (Onwuegbuzie 2002; Schulze 2003).

5.5 Classifications of information technology and data mining research studies

According to Neuman (2007), a research study can be generally classified under one or more of three main different classifications; exploratory, descriptive and explanatory research, based on "what the researcher is trying to accomplish– explore a new topic, describe a social phenomenon or explain why something occur" (Neuman 2007, p. 15).

5.5.1 Explanatory (Analytical) research

As far as this study is concerned it is exploratory and explanatory in nature. Explanatory (Analytical) research involves a high level of control so that a theory's predictions may be tested and explained (Babbie 2001; Neuman 2007). Research of an explanatory nature attempts to extend the theory to new issues or topics, link these issues with a general principle, elaborate the prediction of the theory and provide support or refutation to the prediction (Neuman 2007). The explanatory research attempts to clarify "why" things are the way they are, and "how" a relationship between two aspects of the phenomenon exists (Neuman 2003). Deductive methods of inquiry are predominantly employed in explanatory research since these are a productive means in theory testing when the theory already exists and data can be collected to confirm or deny it (Neuman 2003). Accordingly, the quantitative research methods are the common methods that are usually employed within this type of research.

5.5.2 Exploratory research

In exploratory research, a study may seek to investigate a relatively new topic or issue(s) in order to reach a better understanding and provide a knowledge base about the issue(s) for further research (Babbie 2001). Exploratory research is conducted when there are few or no earlier studies to which references can be made for information. The aim is to look for patterns, ideas or hypotheses rather than testing or confirming a

hypothesis. In exploratory research the focus is on gaining insights and familiarity with the subject area for more rigorous investigation later (Saunders *et al.* 2009).

Neuman (2003) describes exploratory research as one approach that is aimed at formulating more structured knowledge over time with the ability to create precise questions which future research may better address. Usually, the exploratory study addresses the "what" question (e.g. what would be the issues pertaining to DM adoption within AIS in publicly listed companies in Jordan?), but the study of an exploratory nature rarely provides conclusive answers to such problems or issues (Neuman 2007). The exploratory research tends to heavily rely on inductive methods of inquiry and the use of the qualitative research approaches rather than wedding to a specific theory or research question (Neuman 2003).

5.5.3 Justification for the research classification of this study

This research study is of an exploratory nature since the researcher is mainly interested in reaching an understanding of the adoption of DM technology within AIS in publicly listed companies in Jordan , and uncovering the interrelated potential relation between the management styles and managers attitude toward DM and the use of DM technology.

However, due to the need to reach a better explanation of managers' acceptance or rejection of the use of DM technology within the AIS, this research study posits itself to have an explanatory dimension as well since it is possible under the scope of explanatory studies to confirm or refute managers' acceptance or rejection of DM technology based on existing theories and models of acceptance.

By classifying the nature of this research as both explanatory and exploratory, the study is believed to have two intertwined characters that are working in tandem rather than being polarised opposites.

5.6 Quantitative and qualitative research methods

Besides classifying IT and DM systems research as exploratory, descriptive and explanatory, IT and DM research is more commonly categorised under quantitative and qualitative approaches (Neuman 2003; Creswell 2009). These two research approaches have been referred to in the literature as research "paradigms", both having roots in the philosophical thinking of the 20th century (Creswell 2009).

Quantitative research has its origins in the natural sciences but its methods are now widely accepted in the social sciences including information systems (Myers 1997). As stated previously, quantitative research methods are traditionally related to the positivist and post-positivist paradigms, with surveys being the most practised approach of data gathering in IST research (Myers 1997; Cecez-Kecmanovic 2001).

Through the quantitative approach, the social reality is viewed as objectively measured. Quantitative approach is defined as "a formal, objective, systematic process in which numerical data are utilised to obtain information about the world" (Burns & Grove 2010, pp. 17-18). The purpose of the quantitative methods is to generate precise measurements of phenomena that can be explained by the accumulation of statistical data (Bryman & Cramer 2009). Its strategy emphasises a deductive approach to the relationship between theory and research, and it involves the use of structured procedures and formal instruments such as: surveys, statistical analysis, and data modelling. Moreover, Bryman & Cramer (2009) point out that to enhance objectivity, recognise faulty conclusions or potentially biased manipulations of the information, an analysis of the collected data must be done using statistical procedures. In this research, a structured questionnaire was used to collect data which was susceptible to statistical analysis.

Qualitative research has originated in the social sciences to enable researchers to study social and cultural phenomena (Myers 1997). Some of the well-known qualitative methods include case study research and action research, with interviews,

questionnaires, observation, texts, documents and researcher's impressions and reactions as the main data sources (Myers 1997). Qualitative research can be practised under any research paradigm (e.g. post-positivist or interpretivist), depending on the nature of the study and the kind of information the researcher is seeking to obtain. Table 5.1 summarises the differences between quantitative and qualitative research approaches.

Table 5.1: Differences between quantitative and qualitative research (Burns & Grove 2010, p. 18) & (Speziale *et al.* 2010, p. 20)

Quantitative	Qualitative
Objective	Subjective
"Hard" science	"Soft" science
Literature review must be done early in Study	Literature review may be done as study progresses or afterward
Tests theory	Develops theory
One reality: focus is concise and narrow	Multiple realities: focus is complex and broad
Reduction, control, precision	Discovery, description, understanding, shared interpretation
Measurable	Interpretive
Mechanistic: parts equal the whole	Organismic: whole is greater than the parts
Report statistical analysis. Basic element of analysis is numbers	Report rich narrative, individual interpretation. Basic element of analysis is words/ideas.
Researcher is separate	Researcher is part of process
Subjects	Participants
Context free	Context dependent
Hypotheses	Research questions
Reasoning is logistic & deductive	Reasoning is dialectic & inductive
Establishes relationships, causation	Describes meaning, discovery
Uses instruments	Uses communication and observation
Strives for generalisation	Strives for uniqueness
Designs: descriptive, correlational, quasi-experimental, experimental	Designs: phenomenological, grounded theory, ethnographic, historical, philosophical, case study.
Sample size: 30 to 500	Sample size is not a concern; seeks "information rich" sample
"Counts the beans"	Provides information as to "which beans are worth counting

In this research, a combination of both the quantitative and qualitative approaches was adopted. Justification for this view rests on the grounds that it helps to facilitate a more valid and holistic picture of society than that which could be acquired by remaining true to only one set of methods (Henn *et al.* 2005). The mixed methodology approach can be used to verify the quality of the information being collected and its validity and reliability (Henn *et al.* 2005; Brewer & Hunter 2006; Bryman & Cramer 2009). Thus, it better enables the researcher to understand what is happening in the real world.

5.7 This research strategy

The quantitative data is used to examine the adoption of DM within AIS in publicly listed companies in Jordan, and also to explain the determinants of this adoption or non-adoption, addressing part of the objectives of this study which cannot be satisfied by the qualitative approach alone. The findings of the quantitative approach used in this study are employed to supplement the findings of the qualitative approach which are concerned with the identification of the issues pertaining to the DM technology adoption within AIS, including understanding the managers' attitude toward DM adoption.

5.8 Data collection preparation and methods

In this study a survey was adopted for the collection of quantitative data. A survey of the accounting and finance managers was under taken to measure acceptance or rejection of the DM technology within AIS in publicly listed companies in Jordan. This research applied a sample survey to explore and investigate the research questions. This method is a common approach to data collection and provides versatility, efficiency, and generalizability (Schutt 2008). This method is the main method of data collection in this research. It was used to identify the dominant management styles within the research context as well as the managers' attitudes towards IT and DM. It involves the application of standardised questionnaire to enable individuals to be placed on a

dimension indicating the degree of favourability towards the object in question (Burns & Grove 2010).

The survey package included an information sheet to participants asking for their cooperation, a return envelope, and a copy of the questionnaire. The information sheet explained the objectives of the study, the possible benefits for participating in this study, and an estimate of time for the respondent to complete the questionnaire. The respondents were assured of confidentiality concerning their personal information. Neither department names nor identification of individuals were used by anyone other than researcher's supervisor and researcher. It also thanked the respondents for their time and effort in participating in the study. The information sheet was printed on the University of Tasmania letterhead. It includes the name and contact information of the researcher. Ethics approval was obtained for the conduct of this research, and the contact person for any ethical enquiries was provided to participants should they have any issues of an ethical nature.

The survey was prepared based on the objectives of this research. Construct measurement scales and coding were developed (Table 5.2).

Table 5.2: The research constructs measurement scales

No.	Construct name	Item No.	Item code	Statement
1	Management Styles (people and task-centred questions)	1	Mangstyle1	In this Company, management decisions are made on the basis of agreement and consensus between staff and management.
		2	Mangstyle2	I always make the final decision and instruct staff to implement that decision.
		3	Mangstyle3	I like to share my leadership power with my subordinates.
		4	Mangstyle4	I set tasks and schedules and make sure that the staff meet them even if this causes me to be unpopular.
		5	Mangstyle5	I believe that innovation and unconventional approaches to problem solving should be rewarded.
		6	Mangstyle6	I believe that staff and management should work on a co-operative base to achieve organisational aims.
		7	Mangstyle7	I feel upset if I cannot convince the staff that the decisions I make are the best ones.

No.	Construct name	Item No.	Item code	Statement
1	Management Styles (people and task-centred questions)	8	Mangstyle8	My source of power is based on organisational rules and procedures.
		9	Mangstyle9	My source of power is based on my knowledge about organisational work and activities.
		10	Mangstyle10	I try to capture the allegiance and respect of my staff through the use of my work skills and knowledge.
		11	Mangstyle11	I seek to work in harmony with my staff.
		12	Mangstyle12	I am happy to let staff assume responsibility for important decisions within their job descriptions.
		13	Mangstyle13	This company has many rules and procedures that have to be followed when making decision.
		14	Mangstyle14	When something new occurs, I discuss with senior staff how this will have an impact on the firm and the work undertaken.
		15	Mangstyle15	I am prepared to delegate tasks in order to implement a new procedure or process.
		16	Mangstyle16	I listen to staff opinions about work and take them in consideration.
		17	Mangstyle17	I believe that this company can quickly alter its administrative procedures, reallocate its resources and undertake new activities to meet changes in our operating environment.
		18	Mangstyle18	I believe that staff members should be encouraged to respond creatively to challenging situations.
		19	Mangstyle19	I believe in extensive consultation with staff prior to making management decisions but always reserve the right to make decisions unilaterally.
		20	Mangstyle20	I allow my staff to determine what needs to be done and how to do it
		21	Mangstyle21	Even if the staff disagree with my position on an issue, I impose my own view rather than negotiate a compromise solution.
		22	Mangstyle22	I accept disagreement and try to create a debate about the issues in seeking a resolution.
		23	Mangstyle23	I have rigid commitment to my personal opinion.
		24	Mangstyle24	I actively encourage team work.
		25	Mangstyle25	When making decisions I obtain the information I need, consider it and personally make a firm and quick decision.
		26	Mangstyle26	In making decision I devote large amounts of time to persuading staff to accept my point of view.
		27	Mangstyle27	I tell the staff what has to be done and how to do it.
		28	Mangstyle28	Forward planning begins at department level.
		29	Mangstyle29	My responsibility to the needs of my subordinates is equally as important as getting the job done.
		30	Mangstyle30	My responsibility to the needs of my subordinates is equally as important as working as a team.

No.	Construct name	Item No.	Item code	Statement
1	Management Styles (people and task-centred questions)	31	Mangstyle31	I would not impose a decision if it meant seriously upsetting the staff.
		32	Mangstyle32	My workers know more about their jobs than me, so I allow them to make decisions relating to their job.
		33	Mangstyle33	In this company, staff are encouraged to question existing policies and work methods, to innovative and challenge current thinking.
		34	Mangstyle34	Sometimes I use punishment in order to get the job done in the way I want it to be done.
		35	Mangstyle35	I like to work jointly with my staff in the activities and projects undertaken by this firm.
2	AIS satisfaction	1	AIS-satisfaction	How satisfied are you with your current accounting information system?
3	AIS performance	1	AIS-Accuracy	The data recorded conforms to the actual value.
		2	AIS-uptodate	The data recorded in your system is timely.
		3	AIS-Constant	The representation of the data value is the same in all cases.
4	Use of analysis software	1	UseAnylssoft	Does your department use any software packages to assist in analysing an accounting data**?**
5	DM awareness	1	UseDM-Term	Is the term data mining used in your company?
		2	OtherTerm	Is there any other term used that means data mining?
6	Attitude toward DM	1	Att-TowardDm1	Technology gives me greater control over my daily work activities.
		2	Att-TowardDm2	Products and services that use the newest technologies are much more convenient to use.
		3	Att-TowardDm3	I prefer to use the most advanced technology available.
		4	Att-TowardDm4	Technology makes me more efficient in my occupation.
		5	Att-TowardDm5	I keep up with the latest technological developments in my areas of interest.
		6	Att-TowardDm6	I find myself having fewer problems than other people in making technology work for me.
		7	Att-TowardDm7	I am always open to learn about new and different technologies.
		8	Att-TowardDm8	It is easy to learn how to use technology.
		9	Att-TowardDm9	Overall, I find the technology useful for any task I need to accomplish.
		10	Att-TowardDm.10	I think it would be very good to use data mining technology for analysing accounting data in addition to current methods.
7	DM adoption	1	DMAdoption	Does your company utilise any data mining tools?
		2	DMAdoption-time	For how many years has your company implemented data mining technology?

No.	Construct name	Item No.	Item code	Statement
8	Factors influencing DM adoption	1	DMtechno1	Compatibility of software with existing operating systems.
		2	DMorganis2	Full support from top management.
		3	DMHR3	Effective and adequate training for staff.
		4	DMorganis4	A sufficient financial resources.
9	Factors for not implementing DM	1	NoDMtechno1	Satisfied with current analysis method.
		2	NoDMorgnis2	Lack of expertise to implement data mining.
		3	NoDMHR3	Lack of awareness about data mining.
		4	NoDMorgnis4	Costly to implement new technology.
		5	NoDMorgnis5	Lack of top management support.
		6	NoDMtechno6	Difficult to select appropriate software.
		7	NoDMtechno7	Too complex and time-consuming.
		8	NoDMorgnis8	Lack of management policies.
		9	NoDMorgnis9	Having more pressing problems.
10	Intention to adopt DM	1	Intent-adopt-DM	Does your company intend to adopt data mining?
		2	When-intent-use-Dm	If your company intends to adopt data mining, how soon do you anticipate that it will be operationally implemented?

The survey went through several steps of refinement before it was released to the participants. Challenging issues, such as wording, the sequencing of questions and response time had to be considered first. Principles of good design approach advocated by Cavana et al. (2001) were adopted to minimise measurement errors as much as possible. The principles or guidelines are related to the content, wording and structure of the statements and can be summarised as follows:

1. Every statement was designed with brief content germane to the question of what data was collected for, avoiding at the same time the double-barrelled or compounded questions as much as possible.

2. Good care was taken to ensure that each word in the statement had only one meaning. No double negatives and no leading or biased words or phrases were used. Abbreviations or incomplete sentences were avoided when possible.

3. Attention was taken to ensure that each statement had a clear structure. The questionnaire was designed after a Likert scale. A 'Likert' survey is made up of a series of statements, which are related to individuals' perspectives in relation to a single or multiple objects, in this case the management styles and managers' attitude towards IT and DM adoption within AIS in publicly listed companies in Jordan.

4. To minimise the measurement errors in the design, the instrument was pre-tested via sending a draft of the questionnaire electronically to and academic staff in several Jordanian universities.

5. The pre-test questionnaire was sent to three bilingual Jordanians (English/Arabic people) to ensure that the two versions of the questionnaire matched as closely as possible. The English version was translated into Arabic by a bilingual Jordanian, and then translated back to English by another bilingual Jordanian working independently. The questionnaires in both language versions were compared in order to resolve any differences. The final versions were then used for the main study The full questionnaire has been sent to a panel of experts.

The selection of the Likert scale is made due to the fact that it is the most relevant for measuring attitudinal patterns or exploring theories of attitudes (Oppenheim 1992). According to Lissitz and Green (1975), reliability of the scale increases with the increments of the number of choices up to five in a scale, but levels off beyond. Therefore, the selection of the five-point scale was made after considering the need to reduce the response burden on the survey participants while obtaining comparable scores to other higher scale formats, such as the seven-point or the ten-point scales (Dawes 2008).

The Likert scale is an interval rating scale, showing responses that vary from a strong affirmation to a strong refutation with a mid-point indicating a neutral response. Each response on the scale is considered equal in attitude or value loading to the others. For each of the survey statements, the participants are asked to rate from “Strongly

disagree" to "Strongly agree". The rating scale is repeated with every statement to ensure easy referencing. One concern, however, is the participant's possible tendency to use one of the two ends of the rating scale for all of the answers he or she is giving. When the researcher ends with such a case, the reply is simply discarded from further analysis.

The nature of the research issues and the ill-defined technical knowledge among the practitioners make the direct questionnaire method more appropriate than any other survey method such as mail questionnaires, telephone interviews or electronic mail. Another advantage of this method is the possibility of generalising results. In addition, it is an efficient way of collecting data in a short period of time with low cost. It also enables the researcher to interact directly with participants (Haralambos *et al.* 2004). Haralambos *et al.* (2004) claimed that using other types of research methods such as unstructured interviewing or observation would be less suitable and difficult to translate into statistical form. Other advantages for the use of survey method include: standardisation, ease of administration, ability to tap the unseen, and sensitivity to subgroup differences which is a major concern in this research (Polit & Beck 2004).

Qualitative data was collected adopting semi-structured interviews. This approach was adopted to understand the attitude of Jordanian publicly listed companies' managers toward utilisation of DM technology within AIS. This method helps in exploring the perspectives of the stakeholders regarding the matters of concern and potential impediments to the nationwide utilisation of the DM technology. The interviews also help to shed light in understanding the anticipated role of each party involved in the DM adoption and to supplement and enrichment the quantitative data collected.

5.8.1 The questionnaire

The questionnaire composed of a cover sheet, brief glossary and the questions (footnote: copy in appendix 1). The questionnaire was composed of three parts: the collection of

general demographic data, the identification of the prevalent and most dominant managerial styles and final section relates to DM readiness and the implementation.

In the second section, the intention was to measure two managerial dimensions, task-oriented and people-oriented management styles. In total 35 items were generated and converted into brief, clear, and easily understood items. Items were scored from 1 (strongly disagree) to 5 (strongly agree).

The identification of the management styles in this questionnaire was based on the managers' perception of their behaviour (*the manager-centric approach).*

The third and final section relates to DM readiness and implementation, this section focuses on managers' attitude towards the adoption of DM within the accounting information systems. Questions included were intended to gauge the general levels of awareness of DM and respondent behaviours and beliefs toward the adoption of technology in particular DM. These questions were identified from the Technology Readiness Index (TRI)'s survey (Parasuraman & Grewal 2000), Data Mining Readiness Index (DMRI) and Technology Acceptance Model (TAM) (Dahlan *et al.* 2002; Legris *et al.* 2003). A set of questions to assess factors influencing the adoption/non adoption of the technology was also included. These factors/reasons were of four types: organisational issues (Dahlan *et al.* 2002; Calderon *et al.* 2003; Su-Chao Chang *et al.* 2003), technological issues (Dahlan *et al.* 2002; Legris *et al.* 2003; Syed-Ikhsan & Rowland 2004), human resources issues (Feelders *et al.* 2000; Dahlan *et al.* 2002) and external factors (Ang *et al.* 2001).

The pre-test version of the questionnaire was sent to two bilingual Jordanians (Arabic/ English people) to ensure that the two versions of the questionnaire matched as closely as possible. The English version was translated into Arabic by a bilingual Jordanian, and then translated back to English by another bilingual Jordanian working independently. The questionnaire in both language versions were compared, in order to resolve any differences. The final versions were then used for the main study.

5.8.2 The interviews

A semi structured approach to the interviews was adopted to enable the researcher to elicit the interviewee's "framework of meanings", expand on areas which the researcher felt were important to probe further, and to ask follow-up questions for clarification (Carter & Henderson 2005; Greeff 2005).

The interview was presented in three sections; the first section seeks basic information about participant's background within company. Second section seeks basic information about accounting information system in participant's company. And the final section relates to DM readiness and the implementation.

The pre-test version of the interview was sent to two bilingual Jordanians (Arabic/ English people) to ensure that the two versions of the interview questions matched as closely as possible. The English version was translated into Arabic by a bilingual Jordanian, and then translated back to English by another bilingual Jordanian working independently. The interviews for both language versions were compared, in order to resolve any differences. The final versions were then used for the main study.

5.9 Sample selection

A random selection of 120 companies from different clusters that represent variety of publicly listed companies was made from the total population of 276 companies listed on the Amman stock exchange in Jordan (ASE 2011). This represents a sampling of 44% of the total population.

The participants in this study are accounting and auditing managers and information technology personnel within accounting and audit departments in the Jordanian publicly listed companies. They were chosen as the target respondent as they are believed to represent the major accounting information system stakeholders within the company and could be expected to have a better understanding of the information issues relating to DM within each company.

Two hundred and fifty questionnaire packages were self-delivered to prospective respondents. A specific date was agreed for the researcher to come and collect the questionnaires. One hundred and eighty questionnaires were collected with an overall response rate of 72%.

The interview conducted with those respondents who were identified and were willing to be interviewed. An abbreviated version of questions used in the interviews and consent form sent to the interviewees before conducting the interviews. The interviews were tape recorded, with the agreement of the interviewees, and notes taken during the interviews to ensure accuracy in recording and transcription of the interviews. All interviews conducted in real-time conversation between interviewer and respondent to discover and to gain additional information regarding respondent's perceptions, experiences, awareness and opinions about DM technologies within their department.

Nine in-depth recorded interviews were carried out with respondents who indicated their willing to be interviewed. The personal details of the participants were removed to allow for anonymity in responses.

On the day of the interview, each participant was asked to sign a consent form signifying his or her acceptance to conduct the interview, if the interview was conducted face-to-face. Alternatively, he or she was asked to send a scanned copy by email or to fax the consent form if the interview was conducted by telephone.

While each interview was projected to last for 45 to 60 minutes, as indicated in the interview's invitation, the interviews ranged between 20-70 minutes in length. Voice recording techniques were used during each interview along with the usual technique of note taking. Each participant was asked whether or not he or she permitted for the interview to be recorded. At the beginning of each interview, the researcher made sure that his contact information was given to the interviewee. The transcript and a copy of the recorded interview were sent back to each interviewee for reference or for further comments and modifications.

Participants were assured that they had the choice to modify the transcript or even void their permission to use the interview material at any stage of the research process.

5.10 Data analysis

1- Quantitative data

Descriptive analysis was undertaken to explore the results prior to an in depth analysis undertaken to test the research questions and hypotheses posed adopting SPSS v.16. SPSS was also used to generate Cronbach's alpha coefficients to assess the reliability of the measurements in the survey instrument.

The analysis process was undertaken based on a theoretical framework that includes six levels of analysis. The first included coding, entering, cleaning, transformation and testing the reliability of the data. The second level included a general description of the participants according to their gender, age, organisational experience, level of education and span of control. Participants were clustered based on these characteristics. The third level of analysis included the analysis of management styles-related items through the use of factor analysis and correlations. This provided answers to the research question that is related to management styles that dominate the Jordanian publicly listed companies. The fourth level of analysis included the exploration of the relationship between management styles and managers attitudes towards IT and DM. This was possible through the use of bivariate correlation. The fifth level of analysis included the exploration of the relationships between the five relevant demographic including gender, age, educational level, organisational experience and span of control and attitudes of managers towards DM. This was made through the use of Mann-Whitney U Test, correlations and bivariate analysis, in addition to frequencies and descriptive statistics. The final level of analysis included the analysis and the testing of the research hypothesis, this includes testing the readiness of the personnel of the Jordanian publicly listed companies to adopt DM technology, explore if technological, organisational and human resource issues are significant influences in the decision to adopt/not adopt DM

technology and explore if there is a significant relationship between awareness of DM and the intention to adopt DM tools. This was possible through the use of descriptive analysis, t-test analysis and correlation analysis. Explanation of each statistical method used covered below.

a) Factor Analysis (FA)

Factor Analysis (FA) is a technique particularly suitable for analysing the patterns of complex, multidimensional relationships encountered by researchers and business people (Hair *et al.* 2006). It is included in the SPSS package as a 'data reduction' technique. It takes a large set of variables and looks for a way that the data may be summarised using a smaller set of components in a meaningful way.

Principal components factor analysis was adopted to ascertain whether each style of management formed a 'factor'. This is based on the identification of the patterns that underline the correlations between a number of variables (the 35 items that assess management styles) which, consecutively, enables the grouping of these items according to their correlations (Miller & Acton 2009). Then, the selected representative items can be used in any subsequent analysis (Green & Salkind 2006; Hair *et al.* 2006).

Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) and the Barlett's Test of Sphericity were used to measure the appropriateness of factor analysis. KMO is one of the statistics associated with factor analysis. It is an index used to measure the appropriateness of factor analysis. High values (between 0.5 and 1.0) indicate factor analysis is appropriate. Values below 0.5 imply that factor analysis may not be appropriate (Kaiser 1974). Barlett's Test of Sphericity tests the null hypothesis that the correlation matrix is an identity matrix, in other words, the population correlation matrix is an identity matrix. A significant result (Sig. < 0.05) indicates matrix is not an identity matrix; i.e., the variables do relate to one another enough to run a meaningful factor analysis (Cochran *et al.* 1983). In this research both tests indicate the appropriate use of factor analysis to analysis management styles items, KMO 0.838 and Sig = 0.000

b) Bivariate analysis

Bivariate analysis or correlation analysis for continuous variables measures the strength of the linear relationships between two pairs of variables. As the variables are interval, the Pearson product moment correlation is adopted. This is the most well-known approach of expressing the effect sizes in terms of strength of association (Leech *et al.* 2005). "Using Pearson *r*, effect size are always less than 1.0, varying between -1.0 and +1.0 with 0 representing no effect and +1 or -1 the maximum effect" (Leech *et al.* 2005, p. 55). In this research bivariate analysis was employed using SPSS to examine the relationships between the sums of management styles (task-centred and people-centred management styles) on the one hand and the sums of the attitudes towards DM on the other. Furthermore, bivariate analysis used to identify the correlations between the five demographic characteristics and the attitudes towards DM. As gender is classified into two discrete group (male and female), difference, not correlation, between these groups and their attitudes towards DM should be assessed. Accordingly, Mann-Whitney U Test used for that purpose. Mann-Whitney U Test is a technique used to test for differences between two independent groups on a continuous measure, in this research it used to examine if males and females differ in terms of their attitudes towards DM.

c) One Sample T-Test

This t-test is adopted to determine the significance of the difference between the mean of a sample of scores and some specified value. In this study, 3 (midpoint of the likert scale) was used as a test value. Three represents a neutral point between agree and disagree, therefore if the mean value falls below the test value, this suggests that the respondent did not agree with that particular item, or question. This test was adopted in the process of testing the research hypothesises.

d) Independent Samples T-Test

The t-test is used to test for a significant difference between the means of two independent or unrelated samples of scores. It can be used with groups of unequal size. (Colman et al., 2006) . The test is used to compare the means of the two groups to assess whether there is a significant difference between the groups. In this study t-test is used to test the research hypothesises.

2- Qualitative data

Qualitative analysis refers to the process that requires the identification of recurring ideas, patterns of beliefs and salient themes from collected data and the attempt to demonstrate support for them (Miles & Huberman 1994). Patton (2002) defines qualitative analysis as the challenging process of transforming data into findings, but more importantly, making sense of it. Patton (2002) argues that while the transformation process involves "reducing the volume of raw information, sifting trivia from significance, identifying significant patterns and constructing a framework for communicating the essence of what the data reveal" (p. 432), there are no shared ground rules for determining what is significant and what is not and no way exists to perfectly replicate the researcher's analytical thought processes. Hence there is no straightforward test that can be applied to determine the reliability and validity of the findings. Nonetheless, Patton (2002) gives his advice to every researcher who wishes to conduct a qualitative analysis to "do your very best with your full intellect to fairly represent the data and communicate what the data reveal given the purpose of the study" (p. 433).

The textual data of the interviews went through preparation processes to make it ready for the analysis. The audio-recorded interviews were transcribed verbatim and each transcription was kept in a separate word document for easy reference. The hand-written interview notes, which were taken by the researcher himself in each interview, were used as an additional source of guidance and information. All transcriptions were then re-read and checked for additional accuracy.

Data was transcribed, translated, and then classified according to major themes. these themes were used to support and validate the questionnaire findings. Issues covered through interviews are varied and include: management styles and behaviour, the role of managers in DM technology adoption process, the impact of technological, organisational, human resource, and external issues on managers' acceptance/no acceptance of DM and DM adoption readiness. The use of interviews proved to be very useful in providing an explanation of the quantitative research outcomes.

5.11 Ethical considerations

Ethics is one of the important constituents of information systems research (Davison 2005). In essence, every researcher is obliged to define his or her actions and responsibilities at any given stage during the research process by means of ethical principles and reasoning (Davison 2005; Creswell 2009). Kimmel (1988) believes that researchers should be aware of the moral issues implicit in their work and of the need to meet their obligations with complete respect to those involved in the research. As a result, to fulfil the specific ethical requirements of this research, the study made sure that it completely adhered to and complied with the ethics and professional conduct guidelines provided by the University of Tasmania before starting the data collection process.

Accordingly, before conducting interviews and questionnaire survey, the approval of the Ethics Committee of the University of Tasmania was obtained in 2011 to protect the rights, liberties and safety of the participants. In addition, an information sheet, including the name of the University of Tasmania and the name of the school, was prepared to explain the purpose of the study and the ethical rules and was given to each participant, attached to the questionnaires. The participants were advised that under the ethical rules, they were participating voluntarily and with no specific risks anticipated with participation in this study, such as psychological, moral, legal or other risks, would occur with them. It advised the respondent to refer any queries or complaints they may have about the way the study was conducted to the Executive Officer of the Human

Research Ethics Committee (Tasmania). A telephone number, an email was provided on the cover letter to that effect (see appendix one).

Personal interviews were conducted with the consent of the participants. Interviewees selected had indicated their willingness to participate in an interview on a form attached to the survey questionnaire. Selected interviewees were provided with an interview information letter, consent form and an indication of the questions to be explored at the interview. Interviewees were advised they could withdraw at anytime without effect or explanation and should he/she wish, also withdraw any data his/her organisation has supplied to date. Once again, before conducting the personal interviews, the participants were fully informed as to the objectives of the research and the ethical rules.

Completed questionnaires of the survey and transcripts of the personal interviews are kept in a locked cabinet at the University of Tasmania under the researcher's control and are available only to the researcher and supervisors.

5.12 Conclusion

This chapter discussed the research design and approaches to be adopted in responding to the research questions and hypothesis posed in this study. Selection and justification of the use of quantitative methodology as a primary mode of enquiry has been discussed. The discussion included comprehensive details about the quantitative and qualitative data collection methods that are employed under the strategy. Under the qualitative approach, the design of the interview protocol and the reasons for choosing the semi-structured approach for conducting the interviews were fully explained. Under the quantitative approach, the design steps of the survey and its different sections were fully discussed.

Due to the fact that ethics are an integral important component in information systems studies, the ethical considerations of this research were delineated in accordance with the ethics and professional conduct guidelines provided by the researcher's university.

In the next chapter the data collected from the returned questionnaires and the conducted interviews is presented and discussed.

6 Discussion of the Results of Data Collection

6.1 Introduction

This chapter presents the data and an analysis of the data collected. A total of 250 individuals were invited to participate in the questionnaire survey, 180 responses were received, and 9 interviews were conducted with respondents who had indicated a willingness to be interviewed.

An overall response rate of 72% was achieved from 250 survey packages self-delivered (personally delivered and collected) to potential respondents. Marcoulides and Saunders (2006) argued that researchers should obtain adequate sample sizes in order to ensure stable estimates of prediction accuracy and also to permit the detection of low value model coefficients. The response rate for this study would seem to be adequate and the sample size sufficient. A statistical power analysis was carried out using G*Power 3 software (Faul *et al.* 2007) in which a correlation test was performed to assess the adequacy of the sample size to undertake quantitative analysis. The results indicated that a sample size of at least 84 was sufficient to conduct the analysis, which means that the 180 sample size was in excess of that considered adequate to carry out the statistical analysis in this study.

6.2 The descriptive analysis of the survey population

The data of the survey subjects was summarised and reported in aggregated form to maintain anonymity and confidentiality of all respondents. Out of the 180 replies of the survey, 43 were female (23.9%) and 137 were male (76.1%). The sample showed that 5.6% (N=10) of the respondents were less than 25 years old, 10% (N=18) were between 25 and 29 years old, 25% (N=45) were between 30 and 34 years old, 20.6% (N=37) were between 35 and 39 years old, 19.4% (N=35) were between 40 and 44 years old, 10.6% (N=19) were between 45 and 49 years old, 6.7% (N=12) were between 50 and 54

years old, 1.7% (N=3) were between 55 and 59 years old, and only one who were aged 59 or above completed the survey.

Furthermore, the sample showed that 21.1% (N=38) of respondents have work experience for less than 5 years, 31.7% (N=57) of respondents have an experience between 5-10 years, 25.6% (N=46) have an experience between 11-15 years, 14.4% (N=26) of respondents have an experience between 16-20 years and 7.2% (N=13) have more than 20 years of work experience. Concerning the level of education, the sample showed that 1.7% (N=3) of respondents have a high school degree, 6.1% (N=11) have college degree, the majority 71.1% (N=128) have bachelors degree, 18.9% (N=34) have masters degree and 2.2% (N=4) of respondents have doctorate degree.

Moreover, the sample showed that 63.3% (114) of respondents have been in supervisory rule for less than 5 years, 21.1% (N=38) of respondents have been working in supervisory rule for 5-10 years, 9.4% (N=17) of respondents have been working in supervisory rule for 11-15 years, 5% (N=9) of respondents have been working in supervisory rule for 16-20 years and only two respondents have been working in supervisory rule for more than 20 years. Of those managers, 76.6% (N=138) respondents supervise between 1-10 employees, 12.2% (N=22) supervise 11-20 employees, 2.8% (N=5) supervise 21-30 employees, 3.9% (N=7) supervise 31-40 employees, 1.1% (N=2) supervise 41-50 employees and 3.3% (N=6) supervise more than 50 employees.

The characteristic of respondents is summarised in Table 6.1.

Table 6.1: The characteristics of the sample population

Characteristics	Frequency	Percentage (%)
Gender		
Female	43	23.9
Male	137	76.1
Age		
Less than 25 years	10	5.6
25-29	18	10
30-34	45	25

Characteristics	Frequency	Percentage (%)
35-39	37	20.6
40-44	35	19.4
45-49	19	10.6
50-54	12	6.7
55-59	3	1.7
59 or above	1	0.6
Experience		
Less than 5 years	38	21.1
5-10	57	31.7
11-15	46	25.6
16-20	26	14.4
More than 20 years	13	7.2
Level of education		
High school	3	1.7
College	11	6.1
Bachelors	128	71.1
Masters	34	18.9
Doctorate	4	2.2
Years in supervisory rule		
Less than 5 years	114	63.3
5-10	38	21.1
11-15	17	9.4
16-20	9	5
More than 20 years	2	1.1
Number of supervised employees		
1-10	138	76.7
11-20	22	12.2
21-30	5	2.8
31-40	7	3.9
41-50	2	1.1
More than 50 employees	6	3.3

6.3 The descriptive analysis of the interviewees

The researcher completed interviews with the nine respondents who had offered to be interviewed, the interviews completed face-to-face. The personal details of the participants were removed to allow for anonymity in responses.

All nine interviews were undertaken with males from various age categories above 35, no female in any age group nor any male under 35 offered to be interviewed. In the terms of education all interviewees had an undergraduate degree or higher. All interviewees had experience of more than 10 years in the field of Accounting Information Systems. Interviewees' profile data is summarised in Table 6.2.

Table 6.2: Interviewees' profile summary

Profile	Sex	Age	Highest Education	Experience with AIS	Primary Job function
Interviewee 1	Male	35-39	Bachelor Degree in Accounting	10-15	Head Auditor
Interviewee 2	Male	40-44	MBA	15-20	CEO
Interviewee 3	Male	35-39	Masters Degree in Accounting	10-15	Internal Auditor
Interviewee 4	Male	40-44	Master Degree in Business Intelligence	15-20	Business Intelligence and DM developer
Interviewee 5	Male	40-44	MBA	10-15	Bank Manager
Interviewee 6	Male	45-49	Master degree in ERP	10-15	Head of AIS department
Interviewee7	Male	40-44	Master in IT	10-15	Head of IT department
Interviewee 8	Male	35-39	Master in Accounting	10-15	Head of AIS department
Interviewee 9	Male	35-39	Bachelor degree in IT	10-15	Head of IT department

6.4 The reliability of the questionnaire instruments

The researcher wished to assess that the items within the questionnaire were reliable measures of the study constructs and adopted the recommendations of Nunnally and Bernstein (1994) and Agarwal and Karahanna (2000). They recommended the calculation of Cronbach's alpha coefficients to assess the reliability of multiple-item constructs. Nunnally and Bernstein (1994) stated that 0.6 is accepted for newly developed measures, otherwise, 0.70 should serve as the lowest cut-off value. The common threshold value of 0.7 was selected as the minimum acceptable level based. Reliability expresses the extent to which the measures in the research instrument are free of random errors, thus yielding similar consistent results if repeated on the same population (Zikmund & Babin 2007). Table 6.3 shows the Cronbach alpha's, in the case of each construct the result is above 0.70. It is assumed that these items reflecting each construct is a reliable measure.

Table 6.3: Cronbach's alpha reliability statistics

Scale	Cronbach's alpha	Number of Items
Management Styles	0.874	35
AIS Importance (Accurate, Up to date , Consistent)	0.759	3
AIS Performance (Accurate, Up to date , Consistent)	0.861	3
Attitude toward DM	0.933	10
Factors influencing DM adoption	0.824	4
Reasons for not adopting DM	0.864	9

6.5 Satisfaction with the current accounting information system

Over fifty per cent of respondents indicated that they were satisfied with the current system (57.8%). However,31.6% of respondents indicated that the AIS was usable but there was a need for some improvement . Nineteen respondents were not satisfied with current AIS and they think the system needs major improvement (10.6%). Table (6.4) summarises these results.

Table 6.4: Satisfaction with the current accounting information system

Level of satisfaction	N=180	%
Very Satisfied	18	10
Reasonably Satisfied	86	47.8
Needs Improvement, but still usable	57	31.6
Dissatisfied, requires major improvement	19	10.6

A number of factors that are reflective of the 'quality' of an AIS were explored –these were accuracy, consistency and up to datedness – the importance and performance of the AIS was assessed in the context of these three criteria to reflect the level of satisfaction toward the AIS, AIS user satisfaction and its assessment in terms of data quality the system can produce will be considered a surrogate measures for the performance of AIS. The result shows (Table 6.5) that the mean score addressing the importance of the AIS quality factors ranged from 3.77 to 3.92, measured agreement adopting a 5 point likert scale where 1 is strongly disagree and 5 strongly agree. In this result, mean value above 3 shows above average to good agreement toward the importance of those three factors. In sum, respondents agree that these three factors are important in ensuring the quality of the AIS within the department. In looking at the actual performance of the company's AIS, respondents indicated lower levels of agreement on all three criteria. 1 represented poor performance and 5 excellent performance. The mean value ranged from 3.5 to 3.57 (Table 6.5) which corresponded to a good level of performance.

Table 6.5: Analysis of importance and performance factors in the AIS

AIS quality factors	Importance (Mean)	Performance (Mean)
Accuracy	3.92	3.57
Up to date	3.91	3.53
Consistency	3.77	3.50

Exploration of the interview data assisted in understanding the views of the respondents. All interviewees indicated that they were very comfortable and satisfied with the current system and would need to see evidence that an alternate system would be better. It was also agreed that factor such as accuracy, timeliness (up to date) and consistency were important in their accounting systems. For example, one interviewee indicated that the AIS used in the company is excellent, he said *"It is important in my work to have an AIS that can provide accurate, up to date accounting data always to help me in taking important financial decisions. I am very happy with the current AIS, I do not have any problem with it, it get the job done, the outcome of the current AIS are accurate, up to date and consistence"[interviewee 7]*. Although in their view performance of the accounting information system and the level of satisfaction of the overall system was good, there was a feeling that there was a need to ensure continuous improvement to their accounting systems. One interviewee said *"The AIS we have in the company is good, but it have one problem, it doesn't have a data filtering option, I have to deal with huge quantity of data and do a manual filtering and analysis to the generated data, the AIS we have needs some improvement to solve this issue, we need to have a filter tool installed inside it"[interviewee 5]*.

6.6 Using packages to assist in analysing an accounting data within accounting information systems

Survey respondents were asked whether their department were using any particular software packages to assist in analysing accounting data. The majority (71.7%) of respondents indicated that their departments did use software packages to assist in the analysis of accounting data, 20.5% per cent responded that their department did not, and 7.8% did not know. These results show that the majority of publicly listed companies in Jordan utilise software package to analyse accounting data. Table 6.6 summarises the results.

Table 6.6: Use of analysis software to analyse accounting data

	Categories	Frequency	%
Use of analysis software to analyse accounting data	Yes	129	71.7
	No	37	20.5
	Don't know	14	7.8

Exploration of the interviews supports the above results. All interviewees indicated that they are using analysis software to analyse accounting data. For example, one interviewee said *"We are using a software called Discoverer which is a part of Oracle software to assist us in analysing accounting data"[interviewee 6]*. Another interviewee said that *"We are using two software in the company in order to analyse the data generated from the AIS system, Microsoft excel and Oracle, those two software help us in the process of categorising the accounting data in to different groups in order to analyse them quickly and make the right accounting and financial decision"[interviewee 8]* .

6.7 Awareness and knowledge of data mining

Respondents were asked whether their department used the term DM technology. Of respondents 50.5% indicated that the term was not used in their firm, while only 27.8% indicated that the term was used. Interestingly 21.7% were not sure whether the term was or was not used suggesting perhaps it was not. Respondents were asked whether an alternate term was used to reflect data technology – 18.3% indicated an alternate term such as management information systems (MIS), business warehouse (BW) and performance report and statistic were adopted. Again 50.6% indicated an alternate term was not used (which presumably included the 27.8% who indicated that the term data technology was used) suggesting that no term in reference to data technology was adopted by 22.8% of firms surveyed, with a further 31.1% unsure whether an alternate term was used.

The results correlate with the limited knowledge many seem to possess regarding the use of analytical software for AIS, and uncertainty about the utilisation of DM within their department. It does support the view that the usage of DM is minimal at this time. Table 6.7 summarises these results.

Table 6.7: Frequency on awareness of and knowledge of data mining

	Frequency	Per cent
Use of data mining term		
1. Yes	50	27.8
2. No	91	50.5
3. Don't Know	39	21.7
Other terms that means data mining		
1. Yes	33	18.3
2. No	91	50.6
3. Not Sure	56	31.1

Exploration of the interviews data revealed that only three interviewees out of nine were aware of the term – 'data mining' and this term is used inside their companies, the majority of interviewees indicated that they are not aware and they do not have any knowledge of the term of DM, and they said that this term is not used inside their companies. One of the interviewees said *"Yes we are using data mining term in our company, I use Oracle data mining software to filter the data I receive from my staff. The Oracle data mining is a great help in reaching the important data I need quickly"[interviewee 4]*. Another interviewee mentioned that *"We do not use data mining term or any term that means data mining in our company, actually this is the first time I heard of such term" we only use excel to analyse the data we have and it is more than enough" [interviewee 1]*. It would appear that simplistic forms of analysis are common using spread sheets such as excel to perform basic data analysis required by their job function or the needs of management. Interviewees indicate that even though specific software may not be used for data analysis this does not mean that data analysis

is not undertaken, they may not be aware of it, for example, an interviewee mentioned that "*In our department we do not use data mining term at all, but we use excel to analyse the data we have and it is more than enough" [interviewee 2]*.

6.8 Data mining technologies implementation

After measuring the respondents' awareness of DM technology, the next section of the questionnaire asked the respondents if their companies utilise any DM tools such as: Clementine, Enterprise Miner, Intelligent Miner, Darwin, Scenario, Knowledge SEEKER, Oracle9i Data Mining TM, etc) and when they start utilising these tools.

Forty three respondents (23.9%) said that their companies are using DM tools in analysis, Sixty four respondents (35.5%) mentioned that their companies do not use any DM tools and the majority (40.6%) do not know if their companies are using DM tools or not. This gives an indication that there is a lack of knowledge about DM tools since 41% do not know if these tools are used in their companies or not.

For those (43 respondents) who answered "yes" about using DM tool in their companies, 23% said they do not know when their companies start using DM tools, 9.5% said they start using DM tool for 1 to 2 years, the majority 67.5% of respondents said that their companies have been using DM tools for more than 2 years. Table 6.8 summarises these results.

Table 6.8: Data mining technologies implementation

	Categories	Frequency	%
Use of DM software	Yes	43	23.9
	No	64	35.5
	Don't know	73	40.6
When you start using DM	Don't know	10	23
	< 1	4	9.5
	1-2	29	67.5

Exploration of the interview data revealed that only three interviewees mentioned that their company was using DM tools and that they have been using it for more than 2 years. As one interviewee said *"We have been using Oracle data mining successfully for 4 years now, we are happy with the outcome, if we want to analyse any accounting data we request these data to be sent from the accountant's general office where they keep them and then we use Oracle data mining to analyse them" [interviewee 4]*. On the other hand, six interviewees said that the DM tools are not implemented in their companies. One interviewee said *"We do not use any data mining tools in our company because we do not need such tools. We do not have large amount of data in our company, all the data I receive can be analysed manually" [interviewee 9]*.

6.9 Research questions discussion

6.9.1 Jordanian publicly listed companies' management styles

In exploring the knowledge of, intention toward and the implementation of DM technologies a number of questions were posed to explore characteristics of management it is believed may play an influential role in the application of technologies. The first question posed was:

What management styles dominate publicly listed companies in Jordan?

Management styles in Jordanian publicly listed companies' were assessed adopting factor analysis. Thirty-five items were included in the survey to identify the management style of each firm. The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) and the Barlett's Test of Sphericity were used to measure the appropriateness of factor analysis. Both tests indicate the appropriate use of factor analysis to analysis management styles items, KMO 0.838 and Sig = 0.000, (see Table 6.9).

Table 6.9: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.838
Bartlett's Test of Sphericity	Approx. Chi-Square	3053.352
	df	595
	Sig.	.000

Nine factors were identified using factor analysis with eiganvales > 1 (Table 6.10). However the majority of component items (management styles) loaded under 2 factors which can be identified as people and task centred. However, there was some indicator that there may also be manager centric forces at play as suggested by item's (8, 13, 31, 32 and 33) that loaded under a separate factor indicating a more central, and possibly authoritarian role for managers. However, analysing these centric forces is beyond the scope of this research.

Table 6.10: Total Variance Explained[1]

Factor	Total	% of Variance Explained	Cumulative %
1	9.178	26.223	26.223
2	3.873	11.066	37.289
3	2.276	6.504	43.793
4	1.641	4.690	48.483
5	1.515	4.328	52.811
6	1.341	3.830	56.641
7	1.173	3.352	59.993
8	1.073	3.065	63.058
9	1.015	2.900	65.957

[1] Details are shown in Appendix seven.

In relation to the extracted factors, two major factors appeared in the solution representing 30 of the 35 items. These were identified to be people and task oriented factors respectively. Given the focus of this part of the research is on these two management styles these factors are discussed within the thesis. The first identified factor is the people-centred where the manager's interest is directed towards people and their role in managing their own activities. This dimension emphasises the participative approach of decision-making and encourages team working and innovation in relation to organisational activities. The second identified factor is the task-centred management where the manager's interest is directed toward accomplishment of the task through practicing individual authority that is based on the formal use of power and individual decision-making process. In general, the first is representation of the new management styles described in the literature, while the second dimension is representation of the traditional styles of management that, according to the literature, are more dominant within the research context.

To assess the internal reliability of the items that measure each dimension, the correlation between each item and the total score of its dimension was obtained through the examination of the components matrix using principal components analysis, which is perhaps the most popular method of factors extraction and is implemented in a number of statistical software packages (Hutcheson & Sofroniou 1999). This method is part of factor analysis outputs and provides the loading of each item on the general dimension and assesses the suitability of each item for measurement of its particular dimension and thus may suggest elimination of some items. Loading represents the strength of each item in defining the factor (in this case management dimension) (Miller & Acton 2009). The higher the loading of the item the more important it is to measuring of its dimension. All loadings less than .40 have been selected for possible elimination. The .40 cut-off point is generally the minimum acceptable cut-off point among researchers (McCrae & Terracciano 2005).

The majority of items that measure the people oriented dimension where found to have higher loading than .40 on the general factor that represents this dimension. Following the same rule (correlation less than .40), the majority of items that measure the task oriented dimension where found to have higher loading than .40 on the general factor that represents this dimension.

The outcomes of this analysis (Table 6.11) confirm that among the 35 items that were used in the questionnaire to measure the two managerial dimensions, people-oriented and task-oriented management styles, items (1, 3, 5, 6, 7, 9, 10, 11, 12, 14, 15, 16, 17, 18, 20, 22, 24, 28, 29, 30 and 35) loaded in the first dimension and were measuring the people-centred management, while Items (2, 4, 19, 21, 23, 25, 26, 27 and 34) loaded on the second dimension and were measuring the task-centred management. Items (8, 13, 31, 32 and 33) did not load as a dominant factor on either people or task centred dimensions of management style and therefore have been eliminated.

Table 6.11: Component matrix analysis (people and task oriented dimension items loading) [2]

Management Style		Factors Identified	
		People-centred	**Task-centred**
1	In this Company, management decisions are made on the basis of agreement and consensus between staff and management	.458	
2	I always make the final decision and instruct staff to implement that decision.		.436
3	I like to share my leadership power with my subordinates.	.554	
4	I set tasks and schedules and make sure that the staff meet them even if this causes me to be unpopular.		.467
5	I believe that innovation and unconventional approaches to problem solving should be rewarded.	.700	

[2] Details are shown in Appendix seven.

Management Style		Factors Identified	
		People-centred	**Task-centred**
6	I believe that staff and management should work on a co-operative base to achieve organisational aims.	.733	
7	I feel upset if I cannot convince the staff that the decisions I make are the best ones.	.489	
9	My source of power is based on my knowledge about organisational work and activities.	.508	
10	I try to capture the allegiance and respect of my staff through the use of my work skills and knowledge.	.652	
11	I seek to work in harmony with my staff.	.759	
12	I am happy to let staff assume responsibility for important decisions within their job descriptions.	.702	
14	When something new occurs, I discuss with senior staff how this will have an impact on the firm and the work undertaken.	.567	
15	I am prepared to delegate tasks in order to implement a new procedure or process.	.649	
16	I listen to staff opinions about work and take them in consideration.	.724	
17	I believe that this company can quickly alter its administrative procedures, reallocate its resources and undertake new activities to meet changes in our operating environment.	.414	
18	I believe that staff members should be encouraged to respond creatively to challenging situations.	.779	
19	I believe in extensive consultation with staff prior to making management decisions but always reserve the right to make decisions unilaterally.		.504
20	I allow my staff to determine what needs to be done and how to do it	.677	
21	Even if the staff disagree with my position on an issue, I impose my own view rather than negotiate a compromise solution.		.657
22	I accept disagreement and try to create a debate about the issues in seeking a resolution.	.701	

Management Style		Factors Identified	
		People-centred	**Task-centred**
23	I have rigid commitment to my personal opinion.		.678
24	I actively encourage team work.	.731	
25	When making decisions I obtain the information I need, consider it and personally make a firm and quick decision.		.530
26	In making decision I devote large amounts of time to persuading staff to accept my point of view.		.451
27	I tell the staff what has to be done and how to do it.		.631
28	Forward planning begins at department level.	.403	
29	My responsibility to the needs of my subordinates is equally as important as getting the job done.	.414	
30	My responsibility to the needs of my subordinates is equally as important as working as a team.	.499	
34	Sometimes I use punishment in order to get the job done in the way I want it to be done.		.555
35	I like to work jointly with my staff in the activities and projects undertaken by this firm.	.722	

Table 6.11 emphasises the diversity of management styles within the Jordanian publicly listed companies. Two management dimensions were found to be prevalent within this context including people-centred and task-centred management. These dimensions represent various elements of both traditional and new management styles. Unlike other studies that have investigated Arab management (Muna & Simmonds 1980; Atiyyah 1992; Ali & Camp 1995; Hunt & At-Twaijri 1996; Youssef 1996; Elgamal 2000; Iqbal & Mirakhor 2011), this study emphasises that no single style can be identified to explain the nature of management styles within the Jordanian context. These studies have reflected one dimension of management and emphasised a negative perspective concerning the nature of Arab management. This view has not considered the nature of management style as a social element which differs from one manager to another

depending on his personalities, preferences, education, religious commitment, technological and external exposure and several other factors. It also does not consider employees differences with respect to the way they prefer to be managed.

6.9.2 Relationship between managers' attitudes towards IT and DM and their styles of management

The second research question examined the overall relationships between managers' attitudes towards DM and their styles of management. The question posed was:

Research question two: Is there a significant relationship between managers' attitudes towards IT and DM and their styles of management?

Bivariate analysis or correlation analysis for continuous variables measures the strength of the linear relationships between two pairs of variables. In this research bivariate analysis was employed using SPSS to identify the correlations between the five demographic characteristics and the attitudes towards IT and DM. As gender is classified into two discrete group (male and female), difference, not correlation, between these groups and their attitudes towards IT and DM should be assessed. Accordingly, Mann-Whitney U Test used for that purpose.

Furthermore, the use of bivariate analysis enabled the examination of the relationships between the sums of management styles (task-centred and people-centred management styles) on the one hand and the sums of the attitudes towards DM on the other (Table 6.12).

Table 6.12: relationships between managers' attitudes towards IT and DM and their styles of management

		Attitudes towards IT and DM
Task-centred management	Pearson Correlation	-.056
	Sig. (2-tailed)	.457
	N	180
People-centred management	Pearson Correlation	.385**
	Sig. (2-tailed)	.000
	N	180

Table 6.12 clearly indicates significant positive statistical relationships between attitudes of managers towards IT and DM and people-centred style of management respectively. By "statistical significance", it is meant that correlations are substantially different from Zero. The positive relationship indicates that an increase of a manager scores people-centred style increases his/her score on the attitudes scale. People-centred management style has significant positive relationships with attitudes of managers towards IT and DM ($p < .001$).

Task-centred management style, however, have no statistical significant relationships with the attitudes of managers towards IT and DM. Accordingly, people-oriented managers, in general, view IT and DM more positively than their task-oriented counterparts. Managers who achieve high scores on people-centred style of management are most likely to have more favourable attitudes towards IT and DM.

To assess whether these relationships appear to be influenced by the five demographic characteristics (gender, age, organisational experience, educational level and span of control), partial correlation coefficient was employed. This enabled examination of the above relationships while controlling for the effects of these demographic characteristics. The results of this analysis (Table 6.13) indicate that the five

demographic characteristics have no significant impact on the relationships between management styles and the attitudes towards IT and DM.

Table 6.13: Partial correlation coefficient

Control Variables			Attitude toward IT and DM
Gender & Age & Experience & Education & Years in supervisory rule	Attitude toward DM	Correlation	1.000
		Significance (2-tailed)	.
		df	0
	Task-centred management	Correlation	-.080
		Significance (2-tailed)	.295
		df	173
	People-centred management	Correlation	.374
		Significance (2-tailed)	.000
		df	173

The results presented in Table 6.12 are consistent with the theoretical explanations provided in some other studies (Johannessen 1994; Kamal 2006; Boyer-Wright & Kottemann 2008; Vest *et al.* 2012) . For example, Johannessen (1994) identifies management styles as a critical innovation factor that is necessary to the success of IT implementation within an organisation. He identifies some critical innovation factors in relation to IT. Particularly, he emphasises that open management style such as people-centred management style, employees' autonomy, flexibility and the development of interactive learning environment are the most important factors that associated with the success of IT implementation. Pheng (1999) argues that the people's resistance to IT can be eliminated through top management support, employee-manager participation, open communication systems and supportive rewarding system. These ways by which

employees resistance towards a new system can be reduced, are closely related to the style of management prevailing within the organisational context where a new system or change is being introduced. In particular, they seem more related to people oriented management styles and managerial creativity (Islam *et al.* 2010). Most importantly, the results presented in Table 6.12 provided clear empirical evidence which supports the existing theoretical assumptions and present more detailed analysis for the multi-dimensional relationships between management styles and varying components of attitudes towards IT and DM.

6.9.3 Differences between male and female managers regarding their attitudes towards IT and DM

The third research question seeks to find if there any differences of the attitudes of male and female managers towards IT and DM. The question posed was:

Research question three: Are there significant differences between male and female managers regarding their attitudes towards IT and DM?

Mann-Whitney U Test used to explore research question three (Table 6.14), Mann-Whitney U Test is a technique used to test for differences between two independent groups on a continuous measure. For example, do males and females differ in terms of their attitudes towards IT and DM?

Table 6.14: Mann-Whitney U Test Attitudes towards IT and DM vs. gender

	Attitudes towards IT and DM
Mann-Whitney U	2827.500
Wilcoxon W	3773.500
Z	-.397
Asymp. Sig. (2-tailed)	.691

As seen in Table 6.14, the probability value (p) is not less than or equal to .05, so the result is not significant. There is no statistically significant difference in the attitudes of males and females towards IT and DM.

Accordingly, the results concerning gender differences provide a confirmation for other studies that reached similar conclusions indicating the similarity between male and female in relations to their general attitudes towards IT as well as their ability to perform IT applications (e.g. Loyd & Gressard 1984; Howard & Smith 1986; Forster 2000; Ryding 2010; Arishi 2012).

However, results of investigations gender attitudes towards IT and DM have been mixed. In some cases, male have been reported to possess higher skill levels than females in IT softwares (Kay 2006; Kim *et al.* 2012). Ventakesh and Morris (2000) however reported that females were found to be more influenced by the perception of ease of use in the decision to adopt new technology such as DM. This suggests that attitudes toward IT and DM not affected by gender as found by Busch (1995).

6.9.4 Differences between attitudes of managers towards IT and DM according to their ages and their level of experience.

The fourth and the fifth research questions examined the overall relationships between the age of participant, their number of managerial years of working experience and their attitudes towards DM. The two questions posed were:

Research question four: Is age influential in the attitudes of managers towards IT and DM?

Research question five: Is the length of work experience influential in the attitudes of managers towards IT and DM?

Bivariate analysis was employed to identify the correlations between age, experience and the attitude towards IT and DM. Table 6.15 shows this relationship.

Table 6.15: Correlation between age, manager's years of work experience and the attitudes of managers towards IT and DM

		Attitudes towards IT and DM
Age	Pearson Correlation	.007
	Sig. (2-tailed)	.922
	N	180
Manager's experience	Pearson Correlation	-.069
	Sig. (2-tailed)	.357
	N	180

As shown in Table 6.15, age and manager's years of work experience have no statistical significant relationships with the attitudes of managers towards IT and DM. This result confirms the results from other previous studies (e.g. Igbaria & Chidambaram 1997; Al-Khaldi & Olusegun Wallace 1999; Tabak & Barr 1999; Dolan *et al.* 2011; Thatcher *et al.* 2012) that found no significant relationship between age, manager's years of work experience and attitude towards IT. However these results contradict some other previous studies claimed that older, more experience people might fail to match the technical requirements of IT usage (e.g. Thomas 1996; Bill 1997; Carnoy 1997; Kaul 1997; Jasperson *et al.* 2005; Sun 2012). A justification of this contradiction is based on the research instrument each of these studies used and on the context of each particular study.

6.9.5 The relationship –if any- between managers' education level and their attitudes towards IT and DM

The sixth research question aims to examine the relationship –if any- between managers' education level and their attitude towards IT and DM. The question posed was:

Research question six: Is there any significant relationship between the manager's level of education and his/her attitude towards IT and DM?

Bivariate analysis was employed to identify the correlations between manager's level of education and his/her attitude towards DM. Table 6.16 show this relationship.

Table 6.16: Correlation between manager's level of education and his/her attitude towards IT and DM

		Attitudes towards IT and DM
Manager's level of education	Pearson Correlation	.060
	Sig. (2-tailed)	.427
	N	180

As shown in Table 6.16, manager's level of education has no statistical significant relationships with the attitudes of managers towards IT and DM. This result confirms the findings from other previous studies (e.g. Tabak & Barr 1999; Choudrie & Ghinea 2005). However, this result contradicts some other previous studies claimed that individuals having more years of formal educations are expected to adopt new technologies earlier than the ones who have less (Rogers 1995; Hong & Kim 2002; Kwak *et al.* 2011). An explanation of this contradiction is based on the research methods each of these studies used and on the context and environment of each particular study.

6.9.6 Relationship between the manager's span of control and his/her attitude towards IT and DM

The seventh research question aimed to draw attention to the span of control and its relation with the attitudes towards IT and DM, which has not received any attention in previous studies. For this reason and in order to investigate this issue, the following research question was proposed.

Is there any significant relationship between the manager's span of control and his/her attitude towards IT and DM?

As shown in Table 6.17 and using Bivariate analysis, it is observed that no significant correlation were found between manager's span of control and their attitudes towards IT and DM.

Table 6.17: relationship between the manager's span of control and his/her attitude towards IT and DM

		Attitudes towards DM
Manager's span of control	Pearson Correlation	.027
	Sig. (2-tailed)	.724
	N	180

6.10 Conclusion

This chapter presented descriptive, statistical results and interview data that were conducted for this research. The descriptive statistics has shown that many of the respondents were not aware of DM or not sure of the utilisation of data analysis software. Each of the major research questions were analysed. The results of factor analysis indicated that two managerial dimensions can be identified. The first dimension is the task-centred management where the manager's interest is directed toward accomplishment of the task through practising individual authority that is based on formal use of power. The second dimension is the people-centred where the manager's interest is directed towards people and their role in managing their own activities. Items that measured each of these two dimensions were factor analysed and specific management style were identified to represent each dimension. The use of bivariate analysis has shown significant positive statistical relationships between attitudes of managers towards IT and DM and people-centred style of management respectively. Task-centred management style and the demographic characteristics, however, have no statistical significant relationships with the attitudes of managers towards IT and DM.

7 Applying the Data to Test Hypotheses

7.1 Introduction

In the previous chapter the data collected was explored in the context of information collected and the research questions posed. This chapter considers the hypotheses that were posed to underlie this study.

7.2 Attitude toward technology including data mining

Hypothesis One:

In Jordanian publicly listed companies there is a readiness by personnel to adopt data mining technology

Data mining readiness has been judged by four components, optimism, innovativeness, easy to use and usefulness.

The responses are shown in Table 7.1. Responses to the optimism component were positive in that over sixty-one per cent up to about seventy-eight per cent of respondents agreed with those statements. Many respondents indicated that the technology will give them a greater control over their daily work (77.2%), application of newest technology would be convenient to use (77.8%), they prefer to use most advanced technology available to them (61.1%), increase their work and occupation efficiencies (73.9%) and also agreed that it is a good idea to have DM technology in analysing the data as an additional method they currently use (73.4%).

In the case of innovativeness, responses also were positive, as shown in the Table 7.1, majority of the respondents indicated that they always keep themselves up to date with the latest technological development in their areas of interest (56.7%), having a fewer

problems making the technology working for them (74.4%) and always open and keen to learn a new and different technology available to them (72.2%).

Many of the respondents also indicated that they perceived the technology as easy to use when they agreed that the technology is easy to learn on how to use it (60.5%). Furthermore, the majority of the respondents were also agreed that they found the technology is useful for any task they needed to accomplish (77.2%).

Table 7.1: Attitude toward technology including data mining

Statements	Agreement (By Number of Responses)				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Optimism					
Technology gives me greater control over my daily work	31	108	8	25	8
Products and services that use the newest technologies are much more convenient to use	32	108	14	18	8
I prefer to use the most advanced technology available	38	72	29	33	8
Technology makes me more efficient in my occupation	40	93	24	16	7
I think it would be very good to use data mining technology for analysing accounting data in addition to current methods	30	102	36	7	5
Innovativeness					
I keep up with the latest technological developments in my areas of interest	21	81	46	25	7
I find myself having fewer problems than other people in making technology work for me	27	107	24	16	6
I am always open to learn about new and different technologies	24	106	32	12	6
Easy to Use					
It is easy to learn how to use technology	13	96	45	20	6
Usefulness					
Overall, I find the technology useful for any task I need to accomplish	33	106	18	18	5

The descriptive statistics shown in Table 7.2 indicate that all respondents agree with these statements as representing their optimism toward DM readiness. The mean was greater than 3, the mode and median 4 for each statement equating to agreement. All t-tests were positive and significant as summarised in the Table 7.2. Positive and significant results were found for all statements representing optimism. Statement one indicating that the technology gives a greater control over daily work shown a positive and significant, $t(179) = 9.176$, $p<.001$). Similar positive and significant result were also yielded for statements such as products and services that use the newest technologies are much more convenient to use (statement two, $t(179) = 10.252$, $p<.001$), I prefer to use the most advanced technology available (statement three, $t(179) = 6.446$, $p<.001$), Technology makes me more efficient in my occupation (statement four, $t(179) = 10.530$, $p<.001$) and I think it would be very good to use DM technology for analysing accounting data in addition to current methods (statement five, $t(179) = 12.576$, $p<.001$).

Furthermore, descriptive statistics as shown in the Table 7.2 indicated that all statement representing innovativeness are scored a mean greater than 3, with mode and median for these statement equal to 4. T-test on those three statements shown a positive and significant result, $t(179) = 6.264$, $p<.001$, $t(179) = 10.594$, $p<.001$ and $t(179) = 10.799$, $p<.001$) for statements six, statement seven and statement eight respectively.

Finally, t-test on statement nine which represents easy to use technology produced a positive and significant result, $t(179) = 7.402$, $p<.001$, and T-test on statement 10 which represents usefulness of technology produced a positive and significant result as well, $t(179) = 11.324$, $p<.001$.

The results are suggesting that the Jordanian publicly listed companies are ready toward DM technology. They have a positive view of technology, a tendency to be a technology pioneer, perceived the technology to be useful and easy to use. All four components of readiness suggested in the study was found to be a positive and significant indicating the readiness of management and staff in the Jordanian publicly listed companies toward

DM technology. Hypothesis one is supported indicating a readiness to adopt DM technology.

Table 7.2: Attitude toward technology including data mining (T-test)

Statements	Descriptive Statistics			t-test[1] (two-tailed/test value=3)	
	Mode	Median	Mean	T Value	Sig.
Optimism					
1. Technology gives me greater control over my daily work	4.00	4.00	3.72	9.176	.000
2. Products and services that use the newest technologies are much more convenient to use	4.00	4.00	3.77	10.252	.000
3. I prefer to use the most advanced technology available	4.00	4.00	3.55	6.446	.000
4. Technology makes me more efficient in my occupation	4.00	4.00	3.79	10.530	.000
5. I think it would be very good to use data mining technology for analysing accounting data in addition to current methods	4.00	4.00	3.81	12.576	.000
Innovativeness					
6. I keep up with the latest technological developments in my areas of interest	4.00	4.00	3.47	6.264	.000
7. I find myself having fewer problems than other people in making technology work for me	4.00	4.00	3.74	10.594	.000
8. I am always open to learn about new and different technologies	4.00	4.00	3.72	10.799	.000
Easy to Use					
9. It is easy to learn how to use technology	4.00	4.00	3.50	7.402	.000
Usefulness					
10. Overall, I find the technology useful for any task I need to accomplish	4.00	4.00	3.80	11.324	.000

[1] One-Sample T-Test was used with 3 as the "test value" which represents a midpoint of agreement. Value above 3 suggests that respondents generally agreed to that statements toward data mining readiness.

Interview data also supported the first hypothesis. All interviewees were very optimistic, innovative and have a perception on easiness and usefulness of such technology in their working environment. For example, one interviewee said *"It is impossible to work without technology now a days, in the past, I used to spend several hours just to find what I am looking for in the data sheet I have, now in just one click I can find what I need"*, he then added *"I always keep up with the latest technology that I can use on my work, I adopt some, and ignore some mainly for the cost issue"*. He also said *"There is no such hard technology and easy technology, technology is easy but you need to spend some time training how to use it"[interviewee3]*.

7.3 Factors influencing company's decision to employ data mining

Hypothesis two posed that a number of issues such as technological, organisational, and human resources matters influence the decision to adopt DM technologies within public sector.

Hypothesis Two:

Technological, organisational and human resource issues are significant influences in the decision to adopt data mining technology.

Respondents who indicated that their departments do adopt DM tools (43 respondents) were asked what factors were influential in the decision to employ this technology.

The three issues identified focus on technological, organisational and human resources factors. Responses are summarised in Table 7.3. Responses to the technological issues were positive in that twenty eight respondent (65.1%) agreed with the issue identified. The compatibility of DM software with existing operating system is likely to be influential in any decision to employ DM. Over 67% of respondents indicated agreement with the organisational issues agreeing that it was important to have the support of top management and adequate financial resources to support DM technology. Furthermore, there was agreement by thirty three respondents (76.7%) that human resources such as

effective and adequate training for staff was an influential factor to any decision to employ DM technologies.

Table 7.3: Factors influencing decision to employ data mining

Influencing Factors	Agreement (By Number of Responses)				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Factors (Technological Issue)					
Compatibility of software with existing operating systems	3	25	9	2	4
Factors (Organisational Issues)					
Full support from top management	7	25	6	2	3
A sufficient financial resources	9	20	7	4	3
Factors (Human resources issue)					
Effective and adequate training for staff	5	28	4	3	3

From Table 7.3, support from top management and effective and adequate training for staff seems to be the most influencing factors in the decision to adopt this technology with 74.4% and 76.7% agreement.

Individual t-test on the statement representing technological issue which is compatibility of software with existing operating systems (Table 7.4) was positive and significant, $t(42) = 3.103$, $p = .003$.

Table 7.4: Individual T-test: Technological influences

Descriptive Statistics			t-test (two-tailed/test value=3)	
Mode	Median	Mean	T value	Sig
4	4	3.49	3.103	.003

Technological issue such as compatibility of software with existing operating systems influences the decision of DM adopters in the Jordanian publicly listed companies. It

does show it is important for departments to choose compatible software with current operating systems.

The statement (Full support from top management) and the statement (A sufficient financial resources) which represents organisational issues were also produce a positive and significant results, $t(42) = 4.585$, $p<.001$ and $t(42) = 3.774$, $p<.001$) respectively, see (Table 7.5). This issue does appear to influence the decision to adopt DM in Jordanian publicly listed companies. The result shows that top management support and adequate financial resources plays an important role in decision to adopt such technology.

Table 7.5: Individual T-test: Organisational Influences

Factors	Descriptive Statistics			t-tests (two-tailed/test value=3)	
	Mode	Median	Mean	T value	Sig
Full support from top management	4	4	3.72	4.585	.000
A sufficient financial resources	4	4	3.65	3.774	.000

Furthermore, individual t-test on statements representing human resource issue (Table 7.6) also shows a positive and significant influence toward decision to employ DM: Effective and adequate training for staff statement, $t(42) = 4.348$, $p <.001$). This result shows that decision to adopt DM technology also influenced by the existence of an effective and adequate training staff. Human resources issue appears to influence the decision to adopt DM in Jordanian publicly listed companies.

Table 7.6: Individual T-test Human Resources influences

Descriptive Statistics			t-tests (two-tailed/test value=3)	
Mode	Median	Mean	T value	Sig
4	4	3.67	4.348	.000

Overall, the descriptive statistics and series of t-test indicate that these three issues influence the decision to adopt DM in the Jordanian publicly listed companies. Technological, Organisational and human resource issues were found to be significant in the decision to adopt DM technology. Hypothesis two is supported.

Interview data showed support for the second hypothesis. In all three interviews with the interviewees who mentioned that their companies are using DM, it was claimed that top management support is crucial and important in the decision to adopt DM technology. Interviewees also supported the human resources issue as influential in the decision to employ DM technologies. In addition, all interviewees agreed that technological issue such as compatibility of DM software with existing operating systems and organisational issue such as sufficient financial resources are important factors in the decision to adopt DM technology within AIS in publicly listed companies. For example, one interviewee mentioned that *"The need for data mining technology was raised when we expanded our company's work, before we took the decision to implement such technology, we held a meeting with the top management to discuss the need and the cost of such implementation, in addition to the cost issue, the top management were worried that the data mining software would not be compatible with our existing accounting software and that we do not have experienced staff to work in such a system. We contacted Oracle company to enquire about these concerns, they provided us with an estimated cost of the data mining software, and an assurance that this software would be compatible with our existing accounting software and that the training would be provided to the staff upon*

installation. Oracle did a simulation test before implementing the actual data mining software, the top management were satisfied with results and with the cost, they agree to adopt data mining in our system"[interviewee8].

7.4 Reasons for not adopting data mining

In this section, the hypothesis related to the reasons not to adopt DM technologies were analysed. There were three issues identified which were technological, organisational, and human resources.

Hypothesis Three:

Technological, organisational and human resource issues are significant reasons in the decision not to adopt data mining.

Respondents who indicated that their departments were not adopting DM technology (64 respondents) indicated reasons that could be classified as technological, organisational, or human resources issues. The responses are shown in Table 7.7. In terms of technological reasons many respondents indicated that they were satisfied with the current system in place (73.5%), difficult to find the appropriate software (57.9%) and the adoption of technology was too complex and time consuming (42.2%).

Organisational reasons identified for not adopting DM technology included the cost to implement new technology (73.5%), a lack of top management support (76.5%), a lack of management policies (59.4%) and issues that were more important to resolve (56.3%).

Human recourses identified for not adopting DM technology included lack of expertise to implement DM (71.9%) and a lack of awareness about DM (79.7%).

Table 7.7: Reasons for not adopting data mining

Reasons	Agreement (By Number of Responses and %)		
	Strongly Agree	Agree	% of Agreement
Technological Reasons			
Satisfied with current analysis method	6	41	73.5
Difficult to select appropriate software	9	28	57.9
Too complex and time consuming	6	21	42.2
Organisational Reasons			
Costly to implement new technology	9	38	73.5
Lack of top management support	26	23	76.5
Lack of management policies	11	27	59.4
Having more pressing problems	17	19	56.3
Human Resources Reasons			
Lack of expertise to implement data mining	17	29	71.9
Lack of awareness about data mining	20	31	79.7

There would appear to be major challenges in technological, organisational and human resource issues for non-adopters to move forward to adopt DM technology. From Table 7.7, lack of top management support and lack of awareness about DM technology seems to be the most influencing factor in the decision to adopt this technology with 76.5% and 79.7% agreement; these results are constant with previous results about the factors influencing company's decision to employ DM where the support from top management and effective and adequate training for staff are the major influencing factors in the decision to adopt DM technology, it seems that top management support and lack of awareness about DM, hence, no adequate training for staff are the two major challenges facing publicly listed companies in Jordan when it comes to adopt DM technology.

Among the three statements which represent technological reasons for not adopting DM technology (Satisfied with current analysis method, difficult to select appropriate

software and too complex and time consuming), the first two statements produced positive and significant results, for the first statement (Satisfied with current analysis method), t(63) = 6.454, p <.001 and for the second statement (Difficult to select appropriate software), t(63) = 3.969, p <.001, for the third and last statement in technological reasons (Too complex and time consuming) however, the t-test shows an insignificant, t(63)=1.276, p=.206) result. The majority of respondents took a neutral stand with only 42.2% respondents agreeing. This has contributed to the insignificant result (Table 7.8).

Table 7.8: Individual T-test: Technological reasons

Reasons	Descriptive Statistics			t-tests (two-tailed/test value=3)	
	Mode	Median	Mean	T value	Sig
Satisfied with current analysis method	4	4	3.69	6.454	.000
Difficult to select appropriate software	4	4	3.50	3.969	.000
Too complex and time consuming	4	3	3.17	1.276	.206

Statements representing technological issue were found to be reasons for not utilising such technology. Combining those statements a transformed technological reason variable resulted a positive and significant t-test result, t(63) = 4.850, , p <.001) (Table 7.9).

Table 7.9: Transformed Technological reasons for not utilise data mining

Descriptive Statistics			t-tests (two-tailed/test value=3)	
Mode	Median	Mean	T value	Sig
4	3.67	3.45	4.850	.000

The statements (Costly to implement new technology, lack of top management support, lack of management policies and having more pressing problems) which represents organisational reasons for not adopting DM were also produce a positive and significant results (Table 7.10), For the first statement (Costly to implement new technology), $t(63) = 7.571$, $p < .001$. For the second statement (Lack of top management support), $t(63) = 9.328$, $p < .001$. For the third statement (Lack of management policies), $t(63) = 5.351$, $p < .001$ and for the final statement (Having more pressing problems), $t(63) = 5.169$, $p < .001$. These results indicate that the organisational issue contributes to the decision not to adopt DM within the Jordanian publicly listed companies.

Table 7.10: Individual T-test: organisational reasons

Reasons	Descriptive Statistics			t-tests (two-tailed/test value=3)	
	Mode	Median	Mean	T value	Sig
Costly to implement new technology	4	4	3.78	7.571	.000
Lack of top management support	5	4	4.09	9.328	.000
Lack of management policies	4	4	3.63	5.351	.000
Having more pressing problems	4	4	3.67	5.169	.000

In the case of human resource reasons, both statements: lack of expertise to implement DM and lack of awareness about DM have also shown a positive and significant result, $t(63) = 6.177$, $p<.000$) and $t(63) = 9.458$, $p<.000$) respectively (Table 7.11).

Table 7.11: Individual T-test: Human Resource reasons

Reasons	Descriptive Statistics			t-tests (two-tailed/test value=3)	
	Mode	Median	Mean	T value	Sig
Lack of expertise to implement data mining	4	4	3.81	6.177	.000
Lack of awareness about data mining	4	4	4.03	9.458	.000

The lack of expertise is identified as a possible reason that would hinder the Jordanian publicly listed companies along with a lack of staff awareness in the decision to adopt DM technology.

The descriptive statistics and series of t-test above indicate that these three issues did contribute to the reasons in the decision not to adopt DM in the Jordanian publicly listed companies. Hypothesis three is supported

Interview data supported these results and supports hypothesis three that technological, organisational and human resource issues are an important challenge faced by the publicly listed companies in adopting DM technology. All six interviewees with the six interviewees who said that the DM tools are not implemented in their companies showed that the most important reason for not adopting DM in publicly listed companies is lack of top management support and lack of training program of how to use DM technology. One interviewee indicated that *"One of the most important factor to adopt data mining technology is the top management support, without their support it is impossible to use such technology"[interviewee 3]*. Another interviewee said that *"I think data mining technology will cost our company a lot of money and I do not feel it will be easy to use, we have to pay money to purchase the data mining software, pay money to train our staff how to use it and we need to make sure that we choose the appropriate software to our needs, I feel that we have more urgent problems to look at. We do not need such*

technology in our work, we are happy of what we have, such as Excel software. Furthermore, the most important point to adopt data mining technology is having your top manager support, without it you will not be able to implement it even if you need it" [interviewee1].

7.5 Intention to adopt data mining technology

Hypothesis four posed that awareness about DM and perceptions of the impact or benefits that DM could bring to the Jordanian publicly listed companies, may have been driver in the intention to adopt such technology. Therefore it was hypothesised that there will be a relationship awareness of DM and the intention to adopt these technologies.

Hypothesis Four:

There is a significant relationship between awareness of data mining and the intention to adopt data mining tools.

The last question on the questionnaire aimed to explore company's intention to adopt DM technology no matter if the company has implemented DM or not. Out of 180 respondents, the majority (39.4%) did not know whether their companies intent to adopt DM technology or not, only 18.3% were certain that DM technology will be adopted in their companies, thirty three respondents (18.3%) indicated that DM technology will not be adopted in their companies. The results show both promise and concern, promise in that many departments plan to adopt DM but concern that many managers do not know what the department currently adoptes in this regard nor what the intent of the department is.

Furthermore, out of the 147 respondents -180 respondents minus the 33 respondents who indicated that DM will not be adopted in their companies-, seventy six respondents (51.7%) indicated that there is no plan to adopt DM in near future. Only 18.4% of respondents said that DM technology will be adopted in less than one year. Table (7.12) and Table (7.13) summarise these results.

Table 7.12: company's intention to adopt data mining technology

	180 Responses				
	No	Little	Neutral	Sure	Do not know
Does your company intend to adopt data mining?	33 (18.3%)	18 (10%)	25 (13.9%)	33 (18.3%)	71 (39.4%)

Table 7.13: Data mining adoption expected time

	147 Responses				
	Less than 12 months	12-18 months	18-24 months	More than 24 months	No plan to adopt
How soon DM will be operationally implemented?	27 (18.4%)	11 (7.5%)	17 (11.6%)	16 (10.9%)	76 (51.7%)

Respondents, particularly at the interview suggest that the use of DM technology within Jordanian publicly listed companies will increase in the near future. Interviewees had a positive attitude and were ready to learn, accept and use such technology in their workplace. Across interviewees there was strong indication that their department will employ DM technologies in the future. For example, one interviewee said that *"I do not have any problem in adopting data mining technology at my work place, in fact I think that we will need such technology in near future, the data we have is increasing rapidly, we need to take important decision in a short period of time, we have strong competitors and we need to take the lead, and to do that we need a filter technology such as data mining that can help us in extracting the data we need in a short period of time"[interviewee2]*.

The concerns identified reflected to the level of awareness and knowledge of DM technologies within working environment. It appears that the majorities of respondents were not aware of DM, or even of the analytical software used in their current system.

In seeking to test the hypothesis, two variables - awareness and the intention- were used in the analysis. Correlation and cross tabulation were adopted to investigate the hypothesis. Table 7.14 summarised the strength of association between awareness about DM and intention to adopt DM tools.

Table 7.14: Correlation between awareness about data mining and intention to adopt data mining tools

		Intention to adopt DM
Awareness of DM	Pearson Correlation	.082
	Sig. (2-tailed)	.277
	N	180

As shown in Table 7.14, awareness about DM has no statistical significant relationships with the intention to adopt DM tools. Therefore, null hypothesis is not rejected and Hypothesis Four is not supported.

7.6 Conclusion

In this chapter, statistical results supported by the interview results for testing the hypotheses for the study were presented. The descriptive statistics have shown that there is a readiness by personnel of the Jordanian publicly listed companies to adopt DM technology. Respondents identified influencing factors for utilising DM and reasons for not utilising it. In the case of influence factors in the decision to adopt DM, organisational, technological, and human resources issues were important and affect the decision to adopt DM technology. While for those who not adopt the technology, issues relating to technological, organisational and human resources were the reasons identified for their decision not to adopt such technology. The majority of respondents agreed that top management support and lack of knowledge about DM technology are the major

factors influencing company's decision in adopting or not adopting DM technology. The intention to adopt DM tools was found to have no relationship with the knowledge respondent had about it. Hypothesis one, two and three were supported, hypothesis four was not supported.

8 Conclusions, limitations and future work

8.1 Introduction

The major research problem addressed within this study was an investigation of the lack of knowledge of the status of both the awareness and the adoption of DM technology within the accounting information systems in the Jordanian publicly listed companies. The study sought to increase the understanding of the extent DM technology is being utilised, and adopted and whether, where DM technology is not adopted, there are plans to adopt it within the Jordanian publicly listed companies. Areas of interest for this study have been the managers' awareness and readiness toward accepting DM technology, the factors influencing and the reasons for adopting or not adopting this technology.

This Chapter puts forward the conclusion of this research investigation assessing the adoption of DM technology within the Jordanian publicly listed companies. The implications and contributions of this study for practical, research and theory are presented, limitations of this research work are outlined, further research opportunities arising from this research investigation are shared and, finally, a concluding statement is given.

8.2 Concluding remarks

8.2.1 Level of satisfaction on current accounting information system

More than fifty seven per cent (57.8%) of respondents indicated that they were positive toward the accounting information systems currently in place within their departments. However, a significant percentage of respondents (31.6%) indicate that the systems do require improvement and enhancement to provide better information. They identified three quality factors important to the AIS: information generated from the data must be accurate, up-to-date and consistent.

Interviewees as well agreed that they are comfortable and satisfied with the current system and would need to see evidence that an alternate system would be better. Interviewees also agreed that factor such as accuracy, up to date and consistency were important in their accounting systems

8.2.2 Using software packages to assist in analysing accounting data

The majority of respondents (71.7%) indicated that their departments did use software packages to assist in the analysis of accounting data, 20.5% per cent responded that their department did not use any software packages to analyse accounting data, the rest of respondents (7.8%) did not know if their departments using any software packages in analysing accounting data.

Exploration of the interviews supported the above results. All interviewees indicated that they are using analysis software to analyse accounting data.

8.2.3 Awareness of data mining technology

More than half of respondents (50.5%) did not know about DM technology term, 27.8% of respondents indicated that they use DM technologies as a term, while over twenty per cent (21.7%) did not know that the term had even been used within their departments.

Furthermore, thirty three respondents (18.3%) said that their departments use other terms that mean DM, more than half of respondents (50.6%) indicated that there is no other term used that means DM, while the rest (31.1%) were not sure whether or not an alternative term had been used to describe the similar meaning of DM.

In addition, only three interviewees out of nine aware of DM term and this term is used inside their companies, the majority of interviewees indicated that they are not aware and they do not have any knowledge of the term of DM, and they said that this term is not used inside their companies.

8.2.4 Attitude toward data mining

The Readiness towards DM has been judged by using four components: optimism, innovativeness, easy to use and usefulness.

The majority of respondents indicated readiness toward accepting DM technology. They were positively accepting of the relevance of technology such as DM as shown in their agreement toward statements which represent optimism, innovativeness, ease to use and usefulness. The majority of respondents to the optimism component agreed that the technology will give them a greater control over their daily work, application of newest technology would be convenient to use, they prefer to use most advanced technology available to them, increase their work and occupation efficiencies and also agreed that it is a good idea to have DM technology in analysing the data as an additional method they currently use.

The level of technology-innovativeness among respondents was also positive. Respondents indicated interest with the latest technological developments related to their areas of work, they found themselves having less problems in making sure technology was working for them and were always ready to acquire the necessary technological skills. In addition to that, they also perceived that such technology would be easy to use and useful for any task that they need to accomplish.

In sum respondents identified with high levels of optimism, innovativeness and also perceived DM technology as easy to use and useful. This indicates that staff within Jordanian publicly listed companies are ready to use DM technology. Interviews supported the survey's findings.

Interviewees indicated readiness toward accepting DM technology as well; all interviewees were very optimistic, innovative and have a perception on easiness and usefulness of such technology in their working environment.

8.2.5 Adoption of data mining technology

More than seventy six per cent of the respondents either did not use any DM or analytical software or were not aware if any was used in their departments, only forty three respondents (23.9%) said that their companies are using DM tools in analysis. For those forty three respondents who answered "yes" about using DM tool in their departments, 23% said they do not know when their companies start using DM tools, 9.5% said they start using DM tool for 1 to 2 years, the majority 67.5% of respondents said that their companies have been using DM tools for more than 2 years.

Interviews also reveal that the actual use of DM is minimal during this time. Notwithstanding though, it is not uncommon for them to use a generic software such as Microsoft Excel to undertake basic data analysis which suited their job function. Thus, the adoption rates of DM or analytical software in publicly listed companies departments in Jordan could be described as moderate. The finding also suggests that level of awareness about DM itself was low. It would appear that there is low awareness about "Data Mining" terms among respondents. One explanation of this is because the terms itself is a technological jargon as the interviews reveals.

8.2.5.1 Influencing factors for companies who adopted data mining

As proposed in the study, three issues were suggested as factors that influence the decision to adopt DM - technological, organisational and human resources. The analysis undertaken indicated that all four issues did appear to be a significant influence in the decision to use DM technology. The results are summarised in Table 8.1.

Table 8.1: Factors influencing decision to adopt data mining

Influence Factor	Statements	Transformed and One Sample t-test
		Positive and Significant
Technological	Compatibility of software with existing operating systems	Yes
Organisational	Full support from top management A sufficient financial resources	Yes
Human resources	Effective and adequate training for staff	Yes

8.2.5.2 Reasons for companies who do not utilise data mining

Technological -except third statement in technological reasons (Too complex and time consuming) which shows an insignificant result through the t-test analysis- organisational and human resources issues were investigated in identifying reasons why Jordanian publicly listed companies did not adopt DM technology. As found from the perspective of the adopter, technological, organisational and human resource issues were identified to be important. As expected, these internal issues were found to be significant reasons for those who do not adopt DM. The results are summarised in Table 8.2.

Table 8.2: Reasons in the decision not to adopt data mining technology

Reasons	Statements	Transformed and One Sample t-test
		Positive and Significant
Technological	Satisfied with current analysis method	Yes
	Difficult to select appropriate software	Yes
	Too complex and time consuming	No
Organisational	Costly to implement new technology	Yes
	Lack of top management support	
	Lack of management policies	
	Having more pressing problems	
Human resources	Lack of expertise to implement data mining	Yes
	Lack of awareness about data mining	

8.2.5.3 Intention to adopt data mining technology

The majority of respondents (39.4%) did not know whether their companies intend to adopt DM technology or not, only 18.3% were certain that DM technology will be adopted in their companies and the same percentage thirty three respondents (18.3%) indicated that DM technology will not be adopted in their companies.

Furthermore, this study found that out of the 147 respondents -180 respondents minus the 33 respondents who indicated that DM will not be adopted in their companies-; seventy six respondents (51.7%) indicated that there is no plan to adopt DM in their

companies in near future. However, 48.3% of respondents expected that DM technology will be adopted in their companies in near future. Interviews also supported this intention and indicated that they were keen to employ such technology within their department exhibiting a positive attitude and willingness to learn about that technology.

8.3 Summary of research questions findings

The study set out to investigate a number of research questions and objectives that the research was to fulfil. The objective have been achieved and discussed in the thesis. Seven questions were suggested in this research, the first two questions discussed management styles that dominate Jordanian publicly listed companies and if there a significant relationship between managers' attitudes towards IT and DM and their styles of management. The third, fourth, fifth, sixth and seventh questions discussed the relationship if any between managers' attitudes towards DM technology and some demographic characteristics (gender, age, educational level, non-IT organisational experience and span of control).

8.3.1 Management styles

This research presented an empirical investigation that aimed to explore the management styles within the Jordanian publicly listed companies by developing a questionnaire to be completed by selected individuals, which was based on an extensive review of the available literature.

The questionnaire included 35 items that were related to traditional and new management styles characteristics. 250 copies of the questionnaire were distributed directly to participants. 180 copies were completed, collected and analysed. The analysis was conducted using factor analysis and aimed to identify the two managerial dimensions that exist in Jordanian publicly listed companies.

The findings of this research indicate two management styles within the context of Jordanian publicly listed companies, task-centred and people-centred management. The

quantitative findings of this research emphasised that the management styles within Jordanian publicly listed companies are undergoing a process of change compared with the previous studies that investigated the Jordanian and Arab countries.

8.3.2 Management styles and attitudes towards data mining

One of the aims of this research was to explore the association between attitudes of managers towards DM and their identified management styles. Since both attitudes of managers towards DM and their styles of management were clearly identified, the exploration of this association was possible through the use of Bivariate analysis or correlation analysis for continuous variables. The analysis revealed that Task-centred management style has no statistical significant relationships with the attitudes of managers towards DM. However, a significant positive relationship was found between people-centred style of management and managers' general attitudes towards DM. Accordingly, the need for this style of management seems essential to support DM adoption. Instead of imposing technology as a way of changing management behaviour, the creation of appropriate management styles is more effective when considering the impact of managers' themselves on their subordinates.

8.3.3 Demographic characteristics and attitudes towards data mining

After consideration of the available literature, five demographic characteristics were suggested to classify managers, including gender, age, educational level, organisational experience and span of control.

The examination of the relationships if any between these characteristics and attitudes of managers towards DM Technology were carried out though this research study. The statistical analysis using SPSS revealed that there is no statistically significant difference in the attitudes of males and females towards DM. Age and manager's years of work experience have no statistical significant relationships with the attitudes of managers towards DM, manager's level of education has no statistical significant relationships with

the attitudes of managers towards DM and no significant correlation were found between manager's span of control and their attitudes towards DM as well.

8.4 Summary of hypothesis testing

Readiness toward DM technology which measured through optimism, innovativeness, perceive usefulness and perceive ease to use (H1), contributes to the strong intention to adopt DM technology. All four components of readiness suggested in the study was found to be a positive and significant indicating the readiness of management and staff in the Jordanian publicly listed companies toward DM technology.

Technological, organisational and human resource issues were found to be significant factors (H2) in the decision to adopt DM technology. Technological, organisational and human resource issues were also found to be significant reasons (H3) for those who choose not to adopt DM technology.

Awareness about DM has no statistical significant relationships with the intention to adopt DM tools (H4). Therefore, null hypothesis is not rejected and Hypothesis Four is not supported. Table 8.3 summarises the hypothesis testing results.

Table 8.3: Summary of Hypothesis testing

No.	Hypothesis	Relationship Between the Constructs	Direction of Relationship
1	Hypothesis 1 (H1)	In Jordanian publicly listed companies there is a readiness by personnel to adopt DM technology.	+ *Optimism, innovativeness, easy to use and usefulness* → *Readiness towards DM*
2	Hypothesis 2 (H2)	Technological, organisational and human resource issues are significant influences in the decision to adopt DM technology.	+ *Technological, Organisational and Human Resources* → *Adoption of DM*

No.	Hypothesis	Relationship Between the Constructs	Direction of Relationship
3	Hypothesis 3 (H3)	Technological, organisational and human resource issues are significant reasons in the decision not to adopt DM.	+ *Technological, Organisational and Human Resources → Non Adoption of DM*
4	Hypothesis 4 (H4)	There is a significant relationship between awareness of DM and the intention to adopt DM tools.	- *awareness of DM → intention to adopt DM*

8.5 Contributions

This study adds to the scholarly literature in a relatively new area for which there has been little research in investigating the adoption of DM in within AIS in the domain of publicly listed companies. Although there have been several documented studies about the technical feasibility aspects of utilising DM technology especially in the public sector, there is however scant theoretical and empirical research concerning the investigation of different aspects in relation to the adoption of DM technology within AIS in Jordanian publicly listed companies, such as managers' attitudes towards DM, the relationship between managers' attitudes towards DM and their styles of management, and influential factors, reasons, awareness of the concepts, readiness to adopt DM technology. The results of this study contribute:

1. By Identifying the management style that dominate the Jordanian publicly listed companies.
2. By investigating the attitudes of managers towards DM technology.
3. By exploring, in some depth, the association between attitudes of managers towards DM and their identified management styles.

4. By providing insight into the state of adoption and utilisation of technology (i.e. DM technology) in the accounting information system in the Jordanian publicly listed companies.
5. By providing insight to the important issues should be taken into consideration in the implementation of DM in the Jordanian publicly listed companies.
6. By measuring the level of awareness readiness toward accepting DM technology amongst Jordanian publicly listed employees.
7. By providing insights into respondent attitudes toward perception of impact of DM technology.

This study is also contributes by offering insights into departments' top management, accountants, auditors, ICT personnel and academics as well to obtain a better understanding of the issues of the adoption of DM technology within the accounting information systems.

Furthermore, considering the scarcity of management studies in this research particular context (Jordan) and its wider context (Arabic countries), this research provides an original contribution to management literature. The number of organisations involved in this research, the relatively large participants number, and the comprehensive analytical methods that were used in analysing the data, improved the validity as well as the reliability of the cited results.

8.6 The limitations of this study

A number of limitations in this study should be clearly stated. To any extent possible, all steps were taken to minimise or mitigate the effects of these limitations.

1. No distinction has been made between rural areas outside the capital and other central areas in the capital.
2. No distinction has been made between lower and middle line management.
3. Lack of access to the top managers of Jordanian publicly listed companies

prevented the empirical investigation of their role in the DM technology adoption.

4. Explanation and interpretation of the findings were based on a reflective theoretical review of the available studies and nine interviews with participants. Larger number of interviews would have add, if available, more depth to the interpretation of the quantitative findings.

Certainly, the overall findings of this research and its cited limitations have opened the door for more research in this context and provided opportunities for possible future research in both developed and developing countries. These opportunities are outlined in the following section.

8.7 Implication for further research

Several opportunities for further empirical research emerge from this study; the first opportunity would be a replication of this study in difference settings which might include publicly listed companies in other countries to provide interesting insights into national comparisons and international practices. Research on cross-country and cross culture comparisons of the level of readiness, the model utilised, and the impact of such utilisation on decision making. The second opportunity would be a comparison between public and private managers with respect to their attitude towards DM and the management style they prefer will benefit both parties and help bridging the gap between private and public organisations. The third opportunity of this study is related to the previous management literature which needs to be updated to take into consideration the new emerging forces that are changing the nature of public management particularly relating to DM adoption.

Finally, the fourth opportunity is related to the preference of managers towards people oriented management styles , as this can be seen as a reflection of cultural, social, and religious aspects that need to be further explored, identified, and delineated. This should be based on an extensive empirical research which explores the relationships between

these aspects and Arab management in general. Islam, as major cultural attribute in particular should be explored.

Bibliography

Abd Rahman, MS 2008, 'Utilisation of Data Mining Technology within the Accounting Information System in the Public Sector: A Country Study - Malaysia', University of Tasmania.

Abdul-Gader, A & Alangari, K 1996, 'Enhancing IT assimilation in Saudi public organizations: Human resources issues', in E Szewczak, & Khosrowpour M. (ed.), *The human side of information technology management*, Idea Group Publishing, pp. 112-140.

Abrahamson, E 1991, 'Managerial fads and fashions - the diffusion and rejection of innovations', *Academy of management review*, vol. 16, no. 3, pp. 586-612.

Adler, RW 2000, 'Strategic Investment Decision Appraisal Techniques: The Old and the New', *Business Horizons*, vol. 43, no. 6, p. 15.

Agarwal, R & Karahanna, E 2000, 'Time flies when you're having fun: cognitive absorption and beliefs about information technology usage', *MIS quarterly*, vol. 24, no. 4, pp. 665-694.

Agnaia, A & Gherian, L 1997, 'Management training and development within its environment: the case of Libyan industrial companies', *Training*, vol. 117, p. 123.

Al-Jaghoub, S & Westrup, C 2003, 'Jordan and ICT-led development: towards a competition state?', *Information Technology & People*, vol. 16, no. 1, pp. 93-110.

Al-Khaldi, MA & Olusegun Wallace, R 1999, 'The influence of attitudes on personal computer utilization among knowledge workers: the case of Saudi Arabia', *Information & Management*, vol. 36, no. 4, pp. 185-204.

Al-Shammari, A 2000, 'Management Development and National Culture: The Case of the Bahrain! Banking Sector', *Arab Business: The Globalisation Imperative*, p. 135.

Ali, A 1992, 'Management research themes and teaching in the Arab world', *International Journal of Educational Management*, vol. 6, no. 4, pp. 11-17.

Ali, A 1996, 'Organizational development in the Arab world', *The Journal of Management Development*, vol. 15, no. 5, p. 4.

Ali, A & Camp, R 1995, 'Teaching management in the Arab world', *The International Journal of Educational Management*, vol. 9, no. 3.

Almehdl, AA 1998, 'Management development in the Arab world', *Education & Training*, vol. 40, no. 4/5, p. 179.

Amoako-Gyampah, K & Salam, AF 2004, 'An extension of the technology acceptance model in an ERP implementation environment', *Information & Management*, vol. 41, no. 6, pp. 731-745.

Ang, CL, Davies, MA & Finlay, PN 2001, 'An empirical model of IT usage in the Malaysian public sector', *The Journal of Strategic Information Systems*, vol. 10, no. 2, pp. 159-174.

Anthony, RS, Reese, J. S. & Herrenstein, J. H 1994, *Accounting text and cases*, Irwin.

Arbnor, I & Bjerke, B 2008, *Methodology for creating business knowledge*, Sage Publications Ltd.

Arishi, SAM 2012, 'Attitudes of students at saudi arabia's industrial colleges toward computer-assisted language learning (CALL)', *Teaching English with Technology (Teaching English with Technology)*, no. 1, pp. 38-52.

Atiyyah, H 1992, 'Research note: Research in Arab countries, published in Arabic', *Organization Studies*, vol. 13, no. 1, p. 105.

Auer, T & Ruohonen, M 1996, 'Understanding the Human Side of Information Systems Management and Use: A Theoretical Framework and Two Evaluation Approaches', *1996) The Human Side of Information Technology. Idea Group Publishing*, pp. 2-29.

Avgerou, C 2008, 'Information systems in developing countries: a critical research review', *J Inf technol*, vol. 23, no. 3, pp. 133-146.

Avison, DE, Cuthbertson, CH & Powell, P 1999, 'The paradox of information systems: strategic value and low status', *Journal of Strategic Information Systems*, vol. 8, no. 4, pp. 419-445.

Babbie, ER 1998, *The practice of social research*, 8th edn, Wadsworth Pub. Co., Belmont, California.

Babbie, ER 2001, *The Practice of Social Research*, 9th edn, Wadsworth Thomson Learning, Belmont, California.

Bacon, CJ 1992, 'The use of decision criteria in selecting information systems/technology investments', *MIS Q.*, vol. 16, no. 3, pp. 335-353.

Ballou, D & Pazer, H 1985, 'Modeling data and process quality in multi-input, multi-output information systems', *Management Science*, vol. 31, no. 2, pp. 150-162.

Ballou, D, Pazer, H, Belardo, S & Klein, B 1987, 'Implications of data quality for spreadsheet analysis', *ACM SIGMIS Database*, vol. 18, no. 3, pp. 13-19.

Baskerville, R & Pries-Heje, J 1998, 'Information technology diffusion: building positive barriers', *European Journal of Information Systems*, vol. 7, no. 1, pp. 17-28.

Baskerville, R & Smithson, S 1995, 'Information technology and new organizational forms: choosing chaos over panaceas', *European Journal of Information Systems*, vol. 4, no. 2, pp. 66-73.

Bell, V & Harrison, J 1987, *People in organisations* Pitman, London.

Bennett, S & Muraleedharan, V 2000, "New Public Management'and Health Care in Third World', *Economic and Political weekly*, pp. 59-68.

Berry, M & Linoff, G 2004, *Data mining techniques: for marketing, sales, and customer relationship management*, John Wiley & Sons.

Besley, T & Case, A 1993, 'Modeling technology adoption in developing countries', *The American Economic Review*, vol. 83, no. 2, pp. 396-402.

Bill, DT 1997, *Contributing Influences on an Individual's Attitude Towards a New. Technology in the Workplace*, viewed 16/03/ 2011, <http://www.centurionsys.com/rtcl47.html >.

Boje, D, Gephart, R & Thatchenkery, T 1996, *Postmodern management and organization theory*, Sage.

Boyer-Wright, KM & Kottemann, JE 2008, 'High-level factors affecting availability of online government services worldwide', *Electronic Government, An International Journal*, vol. 5, no. 4, pp. 375-389.

Brabazon, T 1997, 'Data mining: A new source of competitive advantage?', *Accountancy Ireland*, vol. 29, pp. 30-31.

Brewer, J & Hunter, A 2006, *Foundations of multimethod research: Synthesizing styles*, Sage Publications, Inc.

Brookfield, D 2000, 'Management styles in the public sector', *Management Decision*, vol. 38, no. 1, pp. 13-18.

Bryman, A & Cramer, D 2009, *Quantitative data analysis with SPSS 14, 15 and 16: A guide for social scientists*, Routledge.

Brynjolfsson, E & Hitt, LM 2003, 'Computing Productivity: Firm-Level Evidence', *Review of Economics and Statistics*, vol. 85, no. 4, pp. 793-808.

Buchanan, BG 2005, 'A (very) brief history of artificial intelligence', *Ai Magazine*, vol. 26, no. 4, pp. 53-60.

Buchholz, R 1977, 'The belief structure of managers relative to work concepts measured by a factor analytic model', *Personnel Psychology*, vol. 30, no. 4, pp. 567-587.

Buchholz, RA 1995, *Business environment and public policy: Implications for management*, Prentice Hall Englewood Cliffs.

Burns, N & Grove, SK 2010, *Understanding Nursing Research*, 5th edn, St. Louis, Mo. : Saunders Elsevier.

Burstein, F & Gregor, S 1999, 'The Systems Development or Engineering Approach to Research in Information Systems: An Action Research Perspective', paper presented to 10th Australasian Conference on Information Systems, Wellington, New Zealand, 1-3 December.

Busch, T 1995, 'Gender differences in self-efficacy and attitudes toward computers', *Journal of Educational Computing Research*, vol. 12, no. 2, pp. 147-158.

Caillouet, A & Lapeyre, B 1992, 'The importance of an accounting information system in the strategic management process', *SAM Advanced Management Journal*, vol. 57, no. 1, pp. 21-24.

Calderon, TG, Cheh, JJ & Kim, IW 2003, 'How large corporations use data mining to create value', *Management Accounting Quarterly*, vol. 4, no. 2, pp. 1-11.

Carnoy, M 1997, 'The new information technology--international diffusion and its impact on employment and skills', *International Journal of Manpower*, vol. 18, no. 1/2, p. 119.

Carter, S & Henderson, L 2005, 'Approaches to qualitative data collection in social science', in A Bowling & S Ebrahim (eds), *Handbook of Health Research Methods: Investigation, measurement and analysis*, 1st edn, Open University Press, London, pp. 215-229.

Cash, J, Nohria, N & Eccles, R 1994, *Building the Information-Age Organization: Structure Control and Information Technologies*, McGraw-Hill Professional.

Castells, M 1998, 'Information Technology, Globalization and Social Development', *Paper Presented for UNRISD Conference*, Geneva, 22-24 June.

Cavana, R, Delahaye, BL & Sekeran, U 2001, *Applied Business research: Qualitative and Quantitative Methods*, 1st edn, John Wiley & Sons Australia, Milton, Queensland.

Cecez-Kecmanovic, D 2001, 'Critical Research in Information Systems: The Question of Methodology', in EM Trauth (ed.), *Qualitative Research in IS: Issues and Trends*, 1st edn, IGI Publishing, Hershey, Pennsylvania, pp. 141-163.

Chapman, J 2001, 'The work of managers in new organisational contexts', *Journal of Management Development*, vol. 20, no. 1, pp. 55-68.

Chatman, J 1991, 'Matching people and organizations: Selection and socialization in public accounting firms', *Administrative Science Quarterly*, vol. 36, no. 3.

Choudrie, J & Ghinea, G 2005, 'Integrated views of e-government website usability: perspectives from users and web diagnostic tools', *Electronic Government, An International Journal*, vol. 2, no. 3, pp. 318-333.

Clarke, R 2000, *Appropriate Research Methods for Electronic Commerce* Australian National University, viewed http://www.rogerclarke.com/EC/ResMeth.html>.

Clegg, S 1990, *Modern organizations: Organization studies in the postmodern world*, Sage Publications Ltd.

Cochran, WG, Moses, LE & Mosteller, F 1983, *Planning and analysis of observational studies*, Wiley Online Library.

Cooke, S 1995, *All You Need to Know About Teleworking ("Net" Guide)*, Future Publishing

Cooper, DR, Schindler, PS & Sun, J 2003, *Business research methods*, McGraw-Hill/Irwin.

Cooper, R & Zmud, R 1990, 'Information technology implementation research: a technological diffusion approach', *Management Science*, vol. 36, no. 2, pp. 123-139.

Creswell, JW 2009, *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, 3rd edn, Sage Publications, Inc., Thousand Oaks, California.

Cukier, W & Middleton, C 1996, 'Cultural Diversity and Group Decision Support Systems', *Chapter 15 in Szewczak, E. J. and Khosrowpour, M. 1996. The Human*

Side of Information Technology Management, Harrisburg, PA: Idea Group Publishing., pp. 294-316.

Cushing, B 1974, 'A mathematical approach to the analysis and design of internal control systems', *Accounting Review*, pp. 24-41.

Daft, R 1998, *Organization Theory and Design*, South-Western Pub.

Dahlan, N, Ramayah, T & Koay, AH 2002, 'Data mining in the banking industry: An exploratory study'.

Dasgupta, S 1997, 'The role of culture in information technology diffusion inorganizations', paper presented to Portland International Conference on Management and Technology, Portland.

Davis, F 1989, 'Perceived usefulness, perceived ease of use, and user acceptance of information technology', *MIS quarterly*, vol. 13, no. 3, pp. 319-340.

Davis, FD 1993, 'User acceptance of information technology: system characteristics, user perceptions and behavioral impacts', *International Journal of Man-Machine Studies*, vol. 38, no. 3, pp. 475-487.

Davis, FD, Bagozzi, RP & Warshaw, PR 1989, 'User acceptance of computer technology: A comparison of two theoretical models', *Management Science*, vol. 35, no. 8, pp. 982-1003.

Davison, RM 2005, 'Ethical Issues', in DE Avison & J Pries-Heje (eds), *Research in Information Systems: A handbook for research supervisors and their students*, 1st edn, Elsevier, Amsterdam, Holland, pp. 143-152.

Dawes, J 2008, 'Do data characteristics change according to the number of scale points used?', *International Journal of Market Research*, vol. 50, no. 1, pp. 61-77.

Doherty, NF & King, M 2005, 'From technical to socio-technical change: tackling the human and organizational aspects of systems development projects', *Eur. J. Inf. Syst.*, vol. 14, no. 1, pp. 1-5.

Dolan, SL, Bejarano, A & Tzafrir, S 2011, 'Exploring the moderating effect of gender in the relationship between individuals' aspirations and career success among engineers in Peru', *The International Journal of Human Resource Management*, vol. 22, no. 15, pp. 3146-3167.

Dreher, M 1994, 'Qualitative Research Methods From the Reviewer's Perspective', in JM Morse (ed.), *Critical Issues in Qualitative Research Methods*, 1st edn, SAGE Publications, Inc., Thousand Oaks, California, pp. 281-297.

Dunham 2006, *Data Mining: Introductory And Advanced Topics*, Pearson Education.

Dunham, M 2003, *Data Mining: Introductory And Advanced Topics, 1/e*, Pearson Education.

El-Rifai, G 1993, 'Investment Policies and Major Determinants of Capital Flows to Arab Countries', *Economic Development of the Arab Countries: Selected Issues*, p. 56.

Elgamal, M 2000, 'In Search of an Arab Management Model: Sources of Arab Management Practices, Problems and Development Needs', *Arab Business: The Globalisation Imperative*, p. 106.

Faul, F, Erdfelder, E, Lang, A-G & Buchner, A 2007, 'G*Power 3: A flexible statistical power analysis for the social, behavioral, and biomedical sciences', *Behavior Research Methods*, vol. 39, no. 2, pp. 175-191.

Fayyad, U, PiatetskyShapiro, G & Smyth, P 1996, 'The KDD process for extracting useful knowledge from volumes of data', *Communications of the ACM*, vol. 39, no. 11, pp. 27-34.

Feelders, A, Daniels, H & Holsheimer, M 2000, 'Methodological and practical aspects of data mining', *Information & Management*, vol. 37, no. 5, pp. 271-281.

Fichman, RG 1992, 'Information technology diffusion: a review of empirical research', *Proceedings of the thirteenth international conference on Information systems*, University of Minnesota, Dallas, Texas, United States.

Firestone, JM 1997, 'Data Mining and KDD: A Shifting Mosaic', *White Paper*, no. 2.

Flynn, N 1995, 'The future of public sector management Are there some lessons from Europe?', *International Journal of Public Sector Management*, vol. 8, no. 4, pp. 59-67.

Fong, A, Hui, S & Jha, G 2002, 'Data mining for decision support', *IT professional*, vol. 4, no. 2, pp. 9-17.

Forster, N 2000, 'The potential impact of third-wave technologies on organisations', *Leadership & Organization Development Journal*, vol. 21, no. 5, pp. 254-263.

Francis, LJ 1994, 'The relationship between computer related attitudes and gender stereotyping of computer use', *Computers & Education*, vol. 22, no. 4, pp. 283-289.

Gallivan, MJ, Spitler, VK & Koufaris, M 2003, 'Does Information Technology Training Really Matter? A Social Information Processing Analysis of Coworkers'

Influence on IT Usage in the Workplace', *J. Manage. Inf. Syst.*, vol. 22, no. 1, pp. 153-192.

Gardner, DG, Discenza, R & Dukes, RL 1993, 'The measurement of computer attitudes: An empirical comparison of available scales', *Journal of Educational Computing Research*, vol. 9, no. 4, pp. 487-507.

Greeff, M 2005, 'Information collection: Interviewing', in Ad Vos, H Strydom, C Fouché & C Delport (eds), *Research at grass roots: For the social sciences and human service professions*, 3rd edn, Van Schaik Publishers, Hatfield, Pretoria, South Africa, pp. 286-313.

Green & Salkind, NJ 2006, 'Using spss for windows and macintosh', *Recherche*, vol. 67, p. 02.

Green, SB & Salkind, NJ 2002, *Using SPSS for the MacIntosh and Windows: Analyzing and Understanding Data*, Prentice Hall PTR.

Greene, JC, Kreider, H & Mayer, E 2005, 'Combining qualitative and quantitative methods in social inquiry', *RESEARCH METHODS*, pp. 274-281.

Greenhalgh, T, Robert, G, Macfarlane, F, Bate, P & Kyriakidou, O 2004, 'Diffusion of innovations in service organizations: systematic review and recommendations', *Milbank Quarterly*, vol. 82, no. 4, pp. 581-629.

Groomer, S & Murthy, U 1989, 'Continuous auditing of database applications: An embedded audit module approach', *Journal of Information Systems*, vol. 3, no. 2, pp. 53-69.

Guba, EG & Lincoln, YS 1994, 'Competing Paradigms in Qualitative Research ', in NK Denzin & YS Lincoln (eds), *Handbook of Qualitative Research*, 1st edn, Sage Publications, Inc., Thousand Oaks, California, pp. 105-117.

Hair, JF, Black, B, Babin, B, Anderson, RE & Tatham, RL 2006, *Multivariate Data Analysis*, 6th edn, Pearson Prentice Hall, New Jersey.

Halal, W 1998, *The new management: Democracy and enterprise are transforming organizations*, Berrett-Koehler Pub.

Hall 2011, *Accounting information systems*, CengageBrain. com.

Hall, JA 1998, *Accounting information systems*, South Western Pub, Cincinnati, Ohio.

Han, J & Kamber, M 2006, *Data mining: concepts and techniques*, Morgan Kaufmann.

Hanna, NK, Guy, K & Arnold, E 1995, *Diffusion of Information Technology: Experience of Industrial Countries and Lessons for Developing Countries*, World Bank Office of the Publisher.

Haralambos, M, Holborn, M & Heald, R 2004, *Sociology: Themes and perspectives*, Collins London.

Harris, R & Davison, R 2002, 'Anxiety and involvement: cultural dimensions of attitudes toward computers in developing societies', *Global Perspective of Information Technology Management*, pp. 234-258.

Harrison, RT & Leitch, CM 2000, 'Learning and Organization in the Knowledge-Based Information Economy: Initial Findings from a Participatory Action Research Case Study', *British Journal of Management*, vol. 11, no. 2, pp. 103-119.

Hatch, JA 2002, *Doing Qualitative Research in Education Settings*, 1st edn, State University of New York Press, Albany.

Hedelin, L & Allwood, C 2002, 'IT and strategic decision making', *Industrial Management and Data Systems*, vol. 102, no. 3, pp. 125-139.

Heeks, R & Stanforth, C 2007, 'Understanding e-Government project trajectories from an actor-network perspective', *European Journal of Information Systems*, vol. 16, no. 2, pp. 165-177.

Heirs, B & Farrell, P 1986, *The professional decision thinker: our new management priority*, Sidgwick & Jackson.

Henn, M, Weinstein, M & Foard, N 2005, *A short introduction to social research*, Sage Publications Ltd.

Higginson, D 1993, *Asia Pacific: its role in the new world disorder*, William Heinemann, Austalia.

Hill, C, Loch, K, Straub, D & Al-Shesshai, K 1998, 'A qualitative assessment of Arab culture and information technology transfer', *Journal of Global Information Management*, vol. 6, no. 3, pp. 29-38.

Hill, CW & Hoskisson, RE 1987, 'Strategy and structure in the multiproduct firm', *Academy of management review*, vol. 12, no. 2, pp. 331-341.

Hirschheim, RA 1992, 'Information Systems Epistemology: An Historical Perspective', in R Galliers (ed.), *Information Systems Research: Issues, Methods and Practical Guidelines*, 1st edn, Blackwell Science Publications, Oxford, London, pp. 28-60.

Hochstrasser, B & Griffiths, C 1991, *Controlling IT investment: strategy and management*, Chapman & Hall.

Hofstede, G 1984, *Culture's consequences: International differences in work-related values*, Sage Publications, Inc.

Hofstede, G 1994, 'Cultures and organizations: Software of the mind. Intercultural cooperation and its importance for survival'.

Hollander, A, Denna, E & Cherrington, J 1999, *Accounting, information technology, and business solutions*, McGraw-Hill Higher Education.

Hong, KK & Kim, YG 2002, 'The critical success factors for ERP implementation: an organizational fit perspective', *Information & Management*, vol. 40, no. 1, pp. 25-40.

Howard, D & Hine, D 1997, 'The Population of Organisations Life Cycle (POLC): Implications for Small Business Assistance Programs', *International Small Business Journal*, vol. 15, no. 3, pp. 30-41.

Howard, GS & Smith, RD 1986, 'Computer anxiety in management: myth or reality?', *Communications of the ACM*, vol. 29, no. 7, pp. 611-615.

Hsiao, CH & Yang, C 2011, 'The intellectual development of the technology acceptance model: A co-citation analysis', *International Journal of Information Management*, vol. 31, no. 2, pp. 128-136.

Hughes, O 1998, *Public management and administration*, Macmillan Basingstoke.

Hunt, D & At-Twaijri, M 1996, 'Values and the Saudi manager: an empirical investigation', *Journal of Management Development*, vol. 15, no. 5, pp. 48-55.

Hutcheson, G & Sofroniou, N 1999, *The multivariate social scientist: Introductory statistics using generalized linear models*, Sage Publications Ltd.

Igbaria, M & Chidambaram, L 1997, 'The impact of gender on career success of information systems professionals: A human-capital perspective', *Information Technology & People*, vol. 10, no. 1, pp. 63-86.

Iqbal, Z & Mirakhor, A 2011, *An introduction to Islamic finance: theory and practice*, vol. 686, Wiley.

Irani, Z, Love, PED & Correspondence 2002, 'Developing a frame of reference for ex-ante IT/IS investment evaluation', *European Journal of Information Systems*, vol. 11, pp. 74-82.

Islam, MA, Ali, AJ & Wafi, SMS 2010, 'Resistance To Change Among First Line Managers In Multinational Organizations In Malaysia', *International Review of Business Research Papers*, vol. 6, no. 4, pp. 232-245.

James, CL & Andy, G 2004, 'Data mining: an in-depth look', *Internal Auditing*, vol. 19, no. 2, p. 4.

Jasperson, J, Carter, PE & Zmud, RW 2005, 'A comprehensive conceptualization of post-adoptive behaviors associated with information technology enabled work systems', *MIS quarterly*, vol. 29, no. 3, pp. 525-557.

Jassawalla, A & Sashittal, H 1998, 'Accelerating technology transfer: thinking about organizational pronoia', *Journal of Engineering and Technology Management*, vol. 15, no. 2-3, pp. 153-177.

Johannessen, JA 1994, 'Information technology and innovation: identifying critical innovation factors', *Information management & computer security*, vol. 2, no. 2, pp. 4-9.

Johnson, J, Leitch, R & Neter, J 1981, 'Characteristics of errors in accounts receivable and inventory audits', *The Accounting Review*, vol. 56, no. 2, pp. 270-293.

Johnson, RB & Onwuegbuzie, AJ 2004, 'Mixed Methods Research: A Research Paradigm Whose Time Has Come', *Educational Researcher*, vol. 33, no. 7, pp. 14-26.

Kaarst-Brown, M & Robey, D 1999, 'More on myth, magic and metaphor', *Information Technology & People*, vol. 12, no. 2, pp. 192-217.

Kaiser, HF 1974, 'An index of factorial simplicity', *Psychometrika*, vol. 39, no. 1, pp. 31-36.

Kakabadse, A, Korac Kakabadse, N & Kouzmin, A 2003, 'Ethics, values and behaviours: comparison of three case studies examining the paucity of leadership in government', *Public Administration*, vol. 81, no. 3, pp. 477-508.

Kakabadse, N & Kouzmin, A 1996, 'Innovation strategies for the adoption of new information technology in government: an Australian experience', *Public Administration and Development*, vol. 16, no. 4, pp. 317-330.

Kamal, MM 2006, 'IT innovation adoption in the government sector: identifying the critical success factors', *Journal of Enterprise Information Management*, vol. 19, no. 2, pp. 192-222.

Kaplan, D, Krishnan, R, Padman, R & Peters, J 1998, 'Assessing data quality in accounting information systems', *Communications of the ACM*, vol. 41, no. 2, pp. 72-78.

Kaul, M 1997, 'The New Public Administration: management innovations in government', *Public Administration and Development*, vol. 17, no. 1, pp. 13-26.

Kay, R 1992, 'An analysis of methods used to examine gender differences in computer-related behavior', *Journal of Educational Computing Research*, vol. 8, no. 3, pp. 277-290.

Kay, R 2006, 'Addressing gender differences in computer ability, attitudes and use: The laptop effect', *Journal of Educational Computing Research*, vol. 34, no. 2, pp. 187-211.

Kim, HJ, Pedersen, S & Baldwin, M 2012, 'Improving User Satisfaction via a Case-Enhanced E-learning Environment', *Education+ Training*, vol. 54, no. 2/3, pp. 10-10.

Kim, TY, Oh, KJ, Sohn, I & Hwang, CH 2004, 'Usefulness of artificial neural networks for early warning system of economic crisis', *Expert Systems with Applications*, vol. 26, no. 4, pp. 583-590.

Kimmel, AJ 1988, *Ethics and Values in Applied Social Research*, 1st edn, Sage Publications, Inc., Newbury Park, California.

Kirlidog, M 1996, 'Information technology transfers to a developing country: Executive information systems in Turkey', *Information Technology & People*, vol. 9, no. 3, pp. 55-84.

Klein, HK & Myers, MD 1999, 'A Set of Principles for Conducting and Evaluating Interpretive Field Studies in Information Systems', *MIS quarterly*, vol. 23, no. 1, pp. 67-93.

Klein, HK & Myers, MD 2001, 'A Classification Scheme for Interpretive Research in Information Systems', in EM Trauth (ed.), *Qualitative Research in IS: Issues and Trends*, 1st edn, IGI Publishing, Hershey, Pennsylvania, pp. 218-239.

Kloptchenko, A, Eklund, T, Karlsson, J, Back, B, Vanharanta, H & Visa, A 2004, 'Combining data and text mining techniques for analysing financial reports: Research Articles', *Int. J. Intell. Syst. Account. Financ. Manage.*, vol. 12, no. 1, pp. 29-41.

Kolekofski, KE, Jr & Heminger, AR 2003, 'Beliefs and attitudes affecting intentions to share information in an organizational setting', *Inf. Manage.*, vol. 40, no. 6, pp. 521-532.

Kuhn, TS 1996, *The structure of scientific revolutions*, University of Chicago press.

Kwak, Y, Park, J, Chung, B & Ghosh, S 2011, 'Understanding End-Users' Acceptance of Enterprise Resource Planning (ERP) System in Project-Based Sectors', *Engineering Management, IEEE Transactions on*, no. 99, pp. 1-12.

Kwon, J & Vogt, CA 2010, 'Identifying the Role of Cognitive, Affective, and Behavioral Components in Understanding Residents' Attitudes toward Place Marketing', *Journal of Travel Research*, vol. 49, pp. 423-435.

Law, WK 2003, 'Information resources development challenges in a cross-cultural environment', in *Managing globally with information technology*, IGI Publishing, pp. 24-35.

Leavitt, H, Pondy, L & Boje, D 1988, *Readings in managerial psychology*, University of Chicago Press.

Lee, SM & Kim, B-O 1996, 'Developing the information systems architecture for world-class organizations', *Management Decision*, vol. 34, no. 2, p. 46.

Leech, NL, Barrett, KC & Morgan Jr, GA 2005, *SPSS for intermediate statistics: Use and interpretation*, Routledge.

Legris, P, Ingham, J & Collerette, P 2003, 'Why do people use information technology? A critical review of the technology acceptance model', *Information & Management*, vol. 40, no. 3, pp. 191-204.

Liao, SH 2003, 'Knowledge management technologies and applications - Literature review from 1995 to 2002', *Expert Systems with Applications*, vol. 25, no. 2, pp. 155-164.

Lin, CY-Y & Chen, W-H 2000, 'The effect of social factors on the implementation of automation: an empirical study in Taiwan', *Journal of Engineering and Technology Management*, vol. 17, no. 1, pp. 39-58.

Lissitz, RW & Green, SB 1975, 'Effect of the Number of Scale Points on Reliability: A Monte Carlo Approach', *Journal of Applied Psychology*, vol. 60, no. 1, pp. 10-13.

Loyd, BH & Gressard, C 1984, 'Reliability and Factorial Validity of Computer Attitude Scales', *Educational and Psychological Measurement*, vol. 44, no. 2, pp. 501-505.

Loyd, BH & Loyd, DE 1985, 'The Reliability and Validity of an Instrument for the Assessment of Computer Attitudes', *Educational and Psychological Measurement*, vol. 45, no. 4, pp. 903-908.

Lu, H & Wang, J 1997, 'The relationships between management styles, user participation, and system success over MIS growth stages', *Information & Management*, vol. 32, no. 4, pp. 203-213.

Mahmood, MA & Mann, GJ 2000, 'Special issue: impacts of information technology investment on organizational performance', *J. Manage. Inf. Syst.*, vol. 16, no. 4, pp. 3-10.

Marcoulides, GA & Saunders, C 2006, 'PLS: A Silver Bullet?', *MIS quarterly*, vol. 30, no. 2, pp. iii-ix.

McCrae, RR & Terracciano, A 2005, 'Universal features of personality traits from the observer's perspective: data from 50 cultures', *Journal of personality and social psychology*, vol. 88, no. 3, p. 547.

McFarlan, F, McKenney, J & Pyburn, P 1982, 'The information archipelago--plotting a course', *Harvard Business Review*, vol. 61, no. 1, p. 145.

McKersie, R & Walton, R 1991, 'Organizational change', *The Corporation of the 1990s: Information Technology and Organizational Transformation, Oxford University Press, New York*, pp. 244-277.

Miles, MB & Huberman, AM 1994, *Qualitative Data Analysis: An Expanded Sourcebook*, 2nd edn, SAGE Publications, Inc., Thousand Oaks, California.

Miller, R & Acton, C 2009, *SPSS for social scientists*, Palgrave Macmillan.

Mingers, J 2001, 'Combining IS research methods: towards a pluralist methodology', *Information Systems Research*, vol. 12, no. 3, p. 240.

Mintzberg, H, Ahlstrand, B & Lampel, J 2005, *Strategy safari: A guided tour through the wilds of strategic management*, Free Pr.

Molla, A & Licker, PS 2005, 'eCommerce adoption in developing countries: a model and instrument', *Information & Management*, vol. 42, no. 6, pp. 877-899.

Montealegre, R 1999, 'A case for more case study research in the implementation of information technology in less-developed countries', *Information Technology for Development*, vol. 8, no. 4, pp. 199-207.

Moon, J-W & Kim, Y-G 2001, 'Extending the TAM for a World-Wide-Web context', *Information & Management*, vol. 38, no. 4, pp. 217-230.

Moscove, S, Simkin, M & Bagranoff, N 1996, *Core concepts of accounting information systems*, Wiley.

Muna, FA & Simmonds, K 1980, *The Arab Executive*, Macmillan New York.

Murthy, US & Wiggins Jr, CE 1999, 'A perspective on accounting information systems research', *Journal of Information Systems*, vol. 13, no. 1, pp. 3-6.

Myers, MD 1997, *Qualitative Research in Information Systems*, MIS Quarterly Discovery, <http://www.misq.org/discovery/MISQD_isworld/>.

Myers, MD & Avison, D 2002, *Qualitative Research in Information Systems: A Reader*, 1st edn, SAGE Publications Ltd, London.

Nemati, HR & Barko, CD 2003, 'Key factors for achieving organizational data-mining success', *Industrial Management & Data Systems*, vol. 103, no. 4, p. 282.

Neuman, WL 2003, *Social Research Methods: Qualitative and Quantitative Approaches*, 5th edn, Allyn and Bacon, Boston, Massachusetts.

Neuman, WL 2007, *Basics of Social Research: Qualitative and Quantitative Approaches*, 2nd edn, Pearson Education, Inc., Boston, Massachusetts.

Nulens, G 1997, 'Socio-cultural aspects of information technology in Africa. The policy of the World Bank Studies on Media Information and Telecommunication (SMIT)', *Communicatio*, vol. 23, no. 2, pp. 15 - 23.

Nunnally, JC & Bernstein, IH 1994, *Psychometric theory*, 3rd edn, McGraw-Hill series in psychology, McGraw-Hill, New York.

O'Callahan, R 1998, 'Technology diffusion and organizational transformation: An integrative framework', *Information systems innovation and diffusion: issues and directions*, pp. 390–410.

Onwuegbuzie, AJ 2002, 'Why Can't We All Get Along? Towards a Framework for Unifying Research Paradigms', *Education*, vol. 122, no. 3, pp. 518-530.

Oppenheim, AN 1992, *Questionnaire Design and Attitude Measurement*, 2nd edn, Pinter Publishers, London.

Orlikowski, WJ & Baroudi, JJ 1991, 'Studying Information Technology in Organizations: Research Approaches and Assumptions', *Information Systems Research*, vol. 1, no. 2, pp. 1-28.

Orr, K 1998, 'Data quality and systems theory', *Commun. ACM*, vol. 41, no. 2, pp. 66-71.

Paradice, D & Fuerst, W 1991, 'An MIS data quality methodology based on optimal error detection', *Journal of Information Systems*, vol. 5, no. 1, pp. 48-66.

Parasuraman, A & Grewal, D 2000, 'The impact of technology on the quality-value-loyalty chain: a research agenda', *Journal of the academy of marketing science*, vol. 28, no. 1, pp. 168-174.

Parker, CM, Wafula, EN, Swatman, PMC & Swatman, PA 1994, 'Information Systems Research Methods: The Technology Transfer Problem', paper presented to 5th Australasian Conference on Information Systems Melbourne, Victoria, September 27-29.

Patton, MQ 2002, *Qualitative Research & Evaluation Methods*, 3rd edn, Sage Publications, Thousand Oaks, California.

Pavlou, PA 2003, 'Consumer Acceptance of Electronic Commerce: Integrating Trust and Risk with the Technology Acceptance Model', *International Journal of Electronic Commerce*, vol. 7, no. 3, pp. 101-134.

Perry, C, Alizadeh, Y & Riege, A 1997, 'Qualitative methods in entrepreneurship research', paper presented to Small Enterprise Association of Australia and New Zealand Annual Conference, Cove Resort, Coffs Harbour, Australia.

Pheng, LS 1999, 'Towards managerial efficacy: Back to 2,000-year-old guiding principles', *Learning Organization, The*, vol. 6, no. 3, pp. 121-132.

Pheng, LS 1999, 'Towards managerial efficacy: back to 2,000-year-old guiding principles', *The Learning Organization: An International Journal*, vol. 6, pp. 121-132.

Phillips, DC & Burbules, NC 2000, *Postpositivism and Educational Research*, 1st edn, Rowman & Littlefield Publishers, Inc., Lanham, Maryland.

Piercy, N 1984, *The Management implications of new information technology*, Taylor & Francis.

Pinsonneault, A & Rivard, S 1998, 'Information technology and the nature of managerial work: from the productivity paradox to the Icarus paradox?', *MIS quarterly*, vol. 22, no. 3, pp. 287-311.

Polidano, C 1999, *The new public management in developing countries*, Institute for Development Policy and Management, University of Manchester.

Polit, DF & Beck, CT 2004, *Nursing research: Principles and methods*, Lippincott Williams & Wilkins.

Preece, D 1995, *Organizations and technical change: strategy, objectives, and involvement*, Cengage Learning.

Preece, J, Rogers, Y & Sharp, H 2002, 'Interaction design: beyond human-computer interaction'.

Priem, RL & Butler, JE 2001, 'Is the resource-based "view" a useful perspective for strategic management research?', *Academy of management review*, vol. 26, no. 1, pp. 22-40.

Purcell, J 1987, 'Mapping management styles in employee relations', *Journal of Management Studies*, vol. 24, no. 5, pp. 533-548.

Putney, LG, Green, JL, Dixon, CN & Kelly, GJ 1999, 'Evolution of qualitative research methodolgy: Looking beyond defense to possibilities', *Reading Research Quarterly*, vol. 34, no. 3, p. 368.

Ragin, CC 1989, *The Comparative Method: Moving Beyond Qualitative and Quantitative Strategies*, 1st edn, University of California Press, Los Angeles, California.

Rarick, CA 1987, 'Self-Determination: The New Management Paradigm', *SAM Advanced Management Journal (07497075)*, vol. 52, no. 3, p. 47.

Raymond, L, Pare, G & Bergeron, F 1995, 'Matching information technology and organizational structure: an empirical study with implications for performance', *European Journal of Information Systems*, vol. 4, no. 1, pp. 3-16.

Reddin, W 1970, *Managerial effectiveness*, McGraw-Hill Book Company, New York.

Reece, MJ & Gable, RK 1982, 'The Development and Validation of a Measure of General Attitudes toward Computers', *Educational and Psychological Measurement*, vol. 42, no. 3, pp. 913-916.

Reed, M 1992, *The sociology of organizations: themes, perspectives and prospects*, Harvester Wheatsheaf.

Riemenschneider, CK, Harrison, DA & Mykytyn, PP 2003, 'Understanding IT adoption decisions in small business: integrating current theories', *Information & Management*, vol. 40, no. 4, pp. 269-285.

Rogers, EM 1995, *Diffusion of innovation*, The Free Press New York.

Rose, G & Straub, D 1998, 'Predicting general IT use: Applying TAM to the Arabic world', *Journal of Global Information Management*, vol. 6, no. 3, pp. 39-46.

Ryding, D 2010, 'The impact of new technologies on customer satisfaction and business to business customer relationships: Evidence from the soft drinks industry', *Journal of Retailing and Consumer Services*, vol. 17, no. 3, pp. 224-228.

Saeed, KA & Abdinnour-Helm, S 2008, 'Examining the effects of information system characteristics and perceived usefulness on post adoption usage of information systems', *Information & Management*, vol. 45, no. 6, pp. 376-386.

Saunders, M, Lewis, P & Thornhill, A 2009, *Research methods for business students*, Prentice Hall.

Schniederjans, MJ & Hamaker, JL 2003, 'A new strategic information technology investment model', *Management Decision*, vol. 41, no. 1, p. 8.

Schulze, S 2003, 'Views on The Combination of Quantitative and Qualitative Research Approaches', *Progressio*, vol. 25, no. 2, pp. 8-20.

Schumacher, P & Morahan-Martin, J 2001, 'Gender, Internet and computer attitudes and experiences', *Computers in Human Behavior*, vol. 17, no. 1, pp. 95-110.

Schutt 1996, *Investigating the social world: The process and practice of research*, Pine Forge Press (Thousands Oaks, Calif.)

Schutt, RK 2008, *Investigating the social world: The process and practice of research*, Pine Forge Press.

Serafeimidis, V & Smithson, S 2003, 'Information systems evaluation as an organizational institution–experience from a case study', *Information Systems Journal*, vol. 13, no. 3, pp. 251-274.

Shaft, TM, Sharfman, MP & Wu, WW 2004, 'Reliability assessment of the attitude towards computers instrument (ATCI)', *Computers in Human Behavior*, vol. 20, no. 5, pp. 661-689.

Siegel, J, & Shim, J. 2007, *chaum's outline of financial management* McGraw-Hill, New York.

Snape, D & Spencer, L 2003, 'The foundations of qualitative research', *Qualitative research practice: A guide for social science students and researchers*, vol. 11.

Speziale, HJS, Streubert, HJ & Carpenter, DR 2010, *Qualitative research in nursing: Advancing the humanistic imperative*, Lippincott Williams & Wilkins.

Straub, D, Keil, M & Brenner, W 1997, 'Testing the technology acceptance model across cultures: A three country study', *Information & Management*, vol. 33, no. 1, pp. 1-11.

Straub, D, Loch, K & Hill, C 2002, 'Transfer of information technology to the Arab world: a test of cultural influence modeling', *Information Technology Management in Developing Countries*, p. 92.

Strong, DM, Lee, YW & Wang, RY 1997, 'Data quality in context', *Communications of the ACM*, vol. 40, no. 5, pp. 103-110.

Su-Chao Chang, A, Hae-Ching, C, Chin-Ho, L & Shu-Chen, K 2003, 'The Effects of Organizational Attributes on the Adoption of Data Mining Techniques in the Financial Service Industry: An Empirical Study in Taiwan', *International Journal of Management*, vol. 20, no. 4, pp. 497-503.

Sun, H 2012, 'Understanding User Revisions When Using Information System Features: Adaptive System Use and Triggers', *MIS Quarterly-Management Information Systems*, vol. 36, no. 2, p. 453.

Syed-Ikhsan, SOS & Rowland, F 2004, 'Knowledge management in a public organization: a study on the relationship between organizational elements and the performance of knowledge transfer', *Journal of Knowledge Management*, vol. 8, no. 2, pp. 95-111.

Tabak, F & Barr, SH 1999, 'Propensity to adopt technological innovations: the impact of personal characteristics and organizational context', *Journal of Engineering and Technology Management*, vol. 16, no. 3-4, pp. 247-270.

Thatcher, J, Dinger, M & George, JF 2012, 'Information Technology Worker Recruitment: An Empirical Examination of Entry-Level IT Job Seekers' Labor Market', *Communications of the Association for Information Systems*, vol. 31, no. 1, p. 1.

Thomas, JDE 1996, 'Computer Anxiety and the User', in E Szewczak & M Khosrowpour (eds), *The Human Side of Information Technology Management*, Idea Group Publishing, pp. 142-157.

Tootell, HI 2007, 'The Social Impact of Using Automatic Identification Technologies and Location-Based Services in National Security ', Doctoral Dissertation thesis, University of Wollongong.

Topp, K & Desjardins, JH 2011, 'Span of control', *Designing organizations for effectiveness. I JA Wolf, H. Hanson & MJ Moirurwick (red.): Organization Development in Health Care. High Impact Practices for a Complex and Changing Environment. Charlotte: Information Age Publishing*, pp. 211-230.

Trochim, WMK 2006, 'Positivism & Post-Positivism', viewed 26 July 2009, <http://www.socialresearchmethods.net/kb/positvsm.php>.

VanderStoep, SW & Johnston, DD 2009, *Research Methods for Everyday Life: Blending Qualitative and Quantitative Approaches*, 1st edn, Jossey-Bass, San Francisco.

Vatanasakdakul, S, Tibben, W & Cooper, J 2004, 'What prevent B2B eCommerce adoption in developing countries?: a socio-cultural perspective'.

Venkatesh, Morris, M, Davis, G & Davis, F 2003, 'User Acceptance of Information Technology: Toward a Unified View', *MIS quarterly*, vol. 27, no. 3, pp. 425-478.

Venkatesh, Thong, J & Xu, X 2012, 'Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology', *MIS quarterly*, vol. 36, no. 1, pp. 157-178.

Venkatesh, V & Morris, MG 2000, 'Why don't men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behavior', *MIS quarterly*, pp. 115-139.

Vest, JR, Menachemi, N & Ford, EW 2012, 'Governance's Role in Local Health Departments' Information System and Technology Usage', *Journal of Public Health Management and Practice*, vol. 18, no. 2, p. 160.

Wah, TY & Bakar, ZA 2003, 'Investigating the status of data mining in practice', *Informing science*, Pori, Finland.

Wang & Clegg, S 2002, 'Trust and decision making: are managers different in the People's Republic of China and in Australia?', *Cross Cultural Management: An International Journal*, vol. 9, no. 1, pp. 30-45.

Wang, RY, Lee, YW, Pipino, LL & Strong, DM 1998, 'Manage your information as a product', *Sloan Management Review*, vol. 39, no. 4, pp. 95-105.

Wang, Y-T 2007, 'Information Technology Investment Decisions and Evaluation in Large Australian Companies: Theory and Practice Compared', Doctor of Philosophy thesis, Griffith University.

Weir, D & BP, R 2000, 'Management in the Arab World: a fourth paradigm?', *Arab Business: The Globalisation Imperative*, p. 60.

Wen, P 2004, 'Hierarchical analysis for discovering knowledge in large databases', *Information systems management*, vol. 21, no. 1, pp. 81-88.

Willcocks, L & Mason, D 1988, 'New technology, human resources and workplace relations- the role of management', *Employee Relations*, vol. 10, no. 6, pp. 3-8.

Wilson, D 1992, *A strategy of change: concepts and controversies in the management of change*, Cengage Learning.

Winter, S, M. Chudoba, K & Gutek, B 1998, 'Attitudes toward computers: when do they predict computer use?', *Information & Management*, vol. 34, no. 5, pp. 275-284.

Witten, I & Frank, E 2002, 'Data mining: practical machine learning tools and techniques with Java implementations', *ACM SIGMOD Record*, vol. 31, no. 1, pp. 76-77.

Yasai-Ardekani & Haug, RS 1997, 'Contextual Determinants of Strategic Planning Processes', *Journal of Management Studies*, vol. 34, no. 5, pp. 729-767.

Yousef, D 1998, 'Predictors of decision-making styles in a non-western country', *Leadership & Organization Development Journal*, vol. 19, no. 7, pp. 366-373.

Youssef, S 1996, 'Structural reform programme of Egyptian state-owned enterprises Current impact and future prospects', *The Journal of Management Development*, vol. 15, no. 5, pp. 88-99.

Yu, S & Neter, J 1973, 'A stochastic model of the internal control system', *Journal of Accounting Research*, pp. 273-295.

Zaltman, G, Duncan, R & Holbek, J 1973, *Innovations and organizations*, John Wiley & Sons Inc.

Zeffane, R & Rugimbana, R 1995, 'Management in the less-developed countries: a review of pertinent issues, challenges and responses', *Leadership & Organization Development Journal*, vol. 16, no. 8, pp. 26-36.

Zhou, Z 2003, 'Three perspectives of data mining', *Artificial Intelligence*, vol. 143, no. 1, pp. 139-146.

Zikmund, WG & Babin, BJ 2007, *Business research methods*, 9th edn, Thomson/South-Western, Mason, Ohio.

Zogby & Artoc 2001, *Jordan Times Newspaper* 1/05/2001.

Appendix One: The study information sheet and questionnaire

Appendix 1.1: The study information sheet and questionnaire- English version

UNIVERSITY OF TASMANIA

School of Accounting and Corporate Governance

PARTICIPANT INFORMATION SHEET- QUESTIONNAIRE
SOCIAL SCIENCE/ HUMANITITES
RESEARCH

'The adoption of data mining technology within accounting information systems in publicly listed companies in Jordan'

Invitation

You are invited to participate in a research study into the adoption of data mining technology (DM) within accounting information systems (AIS), this research looks into the management styles within a technologically developing Arab countries context, including Jordan and provides some empirical and theoretical insights towards understanding the changing and diversifying nature of management styles. In addition, this research explores the managers' attitudes towards information technology (IT) and DM and the relationship between certain demographic characteristics, including age, gender, educational level, organisational experience and span of control and the managers' attitudes towards IT and DM.

The study is being conducted by Asal Al-Odat, a PhD candidate in Accounting, School of Accounting and Corporate Governance, Faculty of Business, University of Tasmania. Under the supervision of:

Associate Professor Trevor Wilmshurst, Deputy Head of School of Accounting.

Dr William Maguire, Senior Lecturer at School of Accounting.

And, Professor Robert Charles Clift Research Advisor in the School of Accounting and Corporate Governance, Faculty of Business, University of Tasmania, Australia.

1. 'What is the purpose of this study?'

The purpose is to investigate the implementation of and the readiness to adopt IT and DM

technology within AIS in publicly listed companies in a developing nation, specifically Jordan. The relationship between managerial styles prevailing in Jordanian publicly listed companies and the managers' attitudes towards IT and DM will be investigated in this research.

2. 'Why have I been invited to participate in this study?'

You are eligible to participate in this study because this study targets senior manager in the finance/accounting area. You were chosen as a target respondent as it is believed you represent a major AIS stakeholder within your company, would have an awareness of technology use within your company and would expect you to have a sound understanding of the information issues within your company.

3. 'What does this study involve?'

In order for me to gather information, I would like to invite you to be a part of this study. The survey will take approximately 30 minutes to complete. Please read the instruction sheet available on the first page of the questionnaire, and then complete the questionnaire as per the instructions. This questionnaire is presented in 3 sections; the first section seeks basic information about your background within company. Second section seeks basic information about your management style. And the final section relates to data mining readiness and the implementation. Once complete please return the survey in the prepaid envelope included for the return of questionnaires. There are no identifiers, so that your responses to this questionnaire are completely anonymous.

Please note that by completing the survey you signify your consent to participate in this research. It is important that you understand that your involvement is this study is voluntary. While I would be pleased to have you participate, I respect your right to decline. There will be no consequences to you if you decide not to participate. If you decide to discontinue participation at any time, you may do so without providing an explanation. All information will be treated in a confidential manner. All of the research will be kept in a locked cabinet in the office of the School of Accounting and Corporate Governance, University of Tasmania, Launceston Campus for 5 years after publication. After this time, all written data and paper documents which have been stored will be shredded. The soft copy of all data stored in the researcher's computer which is located at Room A 261 Building D will be reformatted by IT staff to erase data once the doctorate program has been completed.

4 Are there any possible benefits from participation in this study?

In brief, this research is likely to help senior management in accounting and audit departments and the IT personnel within these departments in publicly listed companies, to obtain a better understanding of the issues of implementation and use of Information technology and Data Mining technology within the area of the accounting information system. In addition, these contributions are expected to benefit both researchers and practitioners. Researchers can benefit by applying the conceptual model developed in this research study in the conduct of similar research in organisational settings other than the publicly listed companies sector and in the conduct of research extending the model and investigating different aspects of the model in more specific strategic contexts. Practitioners can benefit by applying the results of the analysis to their own accounting information system quality data decisions, with an understanding of how those decisions relate to the company's strategic outcomes.

5. Are there any possible risks from participation in this study?

There are no specific risks anticipated with participation in this study.

6. What if I have questions about this research?

If you would like to discuss any aspect of this study please feel free to contact either Asal Al-Odat on ph +61-3-6324-3165 (email: Asal.AlOdat@utas.edu.au) or Associate Professor Trevor Wilmshurst on ph +61-3-6324-3570 (email: Trevor.Wilmshurst@utas.edu.au). Should you be interested in receiving a summary of the results of this survey please email Mr. Asal Al-Odat and this will be sent to you once the data is compiled.

This study has been approved by the Tasmanian Social Science Human Research Ethics Committee, approval number H11834 If you have concerns or complaints about the conduct of this study, you should contact the Executive Officer of the HREC (Tasmania) Network on +61-3-6226-7479 or email human.ethics@utas.edu.au. The Executive Officer is the person nominated to receive complaints from research participants.

Thank you for taking the time to consider this study.

This information sheet is for you to keep.

UNIVERSITY OF TASMANIA
School of Accounting and Corporate Governance

QUESTIONNAIRE INSTRUCTIONS

The adoption of data mining technology within accounting information systems in publicly listed companies in Jordan.

Directions: This questionnaire is presented in 3 sections: the first section seeks basic information about your background within (your) company. Second section seeks basic information about your management style, while the final section relates to data mining readiness and implementation.

Your assistance is greatly appreciated.

To assist you in responding to this questionnaire a number of terms used are defined to ensure you understand how I am using these terms in this study.

Accounting Information System (AIS): is the system that records and processes accounting transactions within functional modules such as, accounts payable, accounts receivable, payroll and trial balances.

Data mining (DM): is a concept that covers a range of techniques for the efficient discovery of this valuable, non-obvious information from such large collections of data. Essentially, data mining is concerned with the analysis of data and the use of software techniques to find patterns and regularities in datasets which enhance the decision making process within the companies.

Data Mining tools: Software, which used to find patterns and regularities in sets of data (for example, Clementine, Enterprise Miner, Intelligent Miner, Darwin, Scenario, Knowledge SEEKER, Oracle9i Data MiningTM, etc).

Adopters of Data Mining: Companies that have implemented data mining tools or currently implementing any data mining software.

Section One: General Information
Please check the box that applies to you.

1. **Sex**
   1☐ Male
   2☐ Female

2. **What age group are you in**
   1☐ Less than 25 years
   2☐ 25-29
   3☐ 30-34
   4☐ 35-39
   5☐ 40-44
   6☐ 45-49
   7☐ 50-54
   8☐ 55-59
   9☐ 59 +

3. **How long have you been working in this company?**
   1☐ Less than 5 years
   2☐ 5-10
   3☐ 11-15
   4☐ 16-20
   5☐ More than 20

4. **Level of education**
   1☐ High school
   2☐ Diploma
   3☐ Bachelors
   4☐ Masters
   5☐ Doctorate
   6☐ Other please identify ----------

5. **How long have you been in a supervisory role**
   1☐ Less than 5 years
   2☐ 5-10
   3☐ 11-15
   4☐ 16-20
   5☐ More than 20

6. **How many employees do you currently supervise**? ----------

Section two: Management styles

Below are a series of statements. They are designed to allow you to indicate the extent to which you agree or disagree with the ideas expressed. Place a 'cross'(**x**) in the space under the label, which is closest to your agreement or disagreement with the statements.

Statement	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
1. In this Company, management decisions are made on the basis of agreement and consensus between staff and management.					
2. I always make the final decision and instruct staff to implement that decision.					
3. I like to share my leadership power with my subordinates.					
4. I set tasks and schedules and make sure that the staff meet them even if this causes me to be unpopular.					
5. I believe that innovation and unconventional approaches to problem solving should be rewarded.					
6. I believe that staff and management should work on a co-operative base to achieve organisational aims.					
7. I feel upset if I cannot convince the staff that the decisions I make are the best ones.					
8. My source of power is based on organisational rules and procedures.					
9. My source of power is based on my knowledge about organisational work and activities.					
10. I try to capture the allegiance and respect of my staff through the use of my work skills and knowledge.					
11. I seek to work in harmony with my staff.					
12. I am happy to let staff assume responsibility for important decisions within their job descriptions.					
13. This company has many rules and procedures that have to be followed when making decision.					
14. When something new occurs, I discuss with senior staff how this will have an impact on the firm and the work undertaken.					
15. I am prepared to delegate tasks in order to implement a new procedure or process.					

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
16. I listen to staff opinions about work and take them in consideration.					
17. I believe that this company can quickly alter its administrative procedures, reallocate its resources and undertake new activities to meet changes in our operating environment.					
18. I believe that staff members should be encouraged to respond creatively to challenging situations.					
19. I believe in extensive consultation with staff prior to making management decisions but always reserve the right to make decisions unilaterally.					
20. I allow my staff to determine what needs to be done and how to do it.					
21. Even if the staff disagree with my position on an issue, I impose my own view rather than negotiate a compromise solution.					
22. I accept disagreement and try to create a debate about the issues in seeking a resolution.					
23. I have rigid commitment to my personal opinion.					
24. I actively encourage team work.					
25. When making decisions I obtain the information I need, consider it and personally make a firm and quick decision.					
26. In making decision I devote large amounts of time to persuading staff to accept my point of view.					
27. I tell the staff what has to be done and how to do it.					
28. Forward planning begins at department level.					
29. My responsibility to the needs of my subordinates is equally as important as getting the job done.					
30. My responsibility to the needs of my subordinates is equally as important as working as a team.					
31. I would not impose a decision if it meant seriously upsetting the staff.					

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
32. My workers know more about their jobs than me, so I allow them to make decisions relating to their job.					
33. In this company, staff are encouraged to question existing policies and work methods, to innovate and challenge current thinking.					
34. Sometimes I use punishment in order to get the job done in the way I want it to be done.					
35. I like to work jointly with my staff in the activities and projects undertaken by this firm.					

Section three: managers' attitude towards the adoption of Data mining within accounting information systems

The purpose of this section is to gather information concerning your attitudes towards Data mining. Please, place a 'cross' (**X**) in the space under the label, which is closest to your agreement or disagreement with the statements.

- **Accounting information systems**

An accounting information system (AIS) is the system that records and processes accounting transactions within functional modules such as, accounts payable, accounts receivable, payroll and trial balances.

1. How satisfied are you with your current accounting information system?

1☐ Very satisfied, no improvement required
2☐ Reasonably satisfied, although some improvement may be required
3☐ Needs improvements, but still usable
4☐ Dissatisfied, system requires major improvement

2. Does your department use any software packages to assist in analysing an accounting data?

1☐ Yes 2☐ No ☐ Don't know

If **yes**, please specify----------

3. Please indicate your agreement with the importance of each of the following influences on the performance of the company.

In column 1, please rate the importance of each factor in ensuring the quality of the AIS based on your perceptions and opinion.

In column 2, please rate the actual performance (achievement) on each of those factors by your company based on your perception and opinion**.**

	Importance	***Performance***
	Strongly disagree Disagree Neutral Agree Strongly agree	**Poor Fair Good Very good Excellent**
3.1. **Accurate**: the data recorded conforms to the actual value	☐**1**☐**2**☐**3**☐**4**☐**5**	☐**1**☐**2**☐**3**☐**4**☐**5**
3.2. **Up-to-date** (timeliness): the data recorded in your system is timely	☐**1**☐**2**☐**3**☐**4**☐**5**	☐**1**☐**2**☐**3**☐**4**☐**5**
3.3. **Consistent**: the representation of the data value is the same in all cases	☐**1**☐**2**☐**3**☐**4**☐**5**	☐**1**☐**2**☐**3**☐**4**☐**5**

- **Data mining readiness**

Data mining is a concept that covers a range of techniques for the efficient discovery of this valuable, non-obvious information from such large collections of data. Essentially, data mining is concerned with the analysis of data and the use of software techniques to find patterns and regularities in datasets which enhance the decision making process within the companies.

1. **Is the term data mining used in your company?** 1☐ Yes 2☐ No 3☐ Don't know
2. **Is there any other term used that means data mining?** 1☐ Yes 2☐ No 3☐ Don't know
   If yes (please specify) _____
3. **Readiness toward technology – these questions seek to gain an understanding of your readiness to adopt technology in particular data mining.**
   Please indicate the degree to which you agree with the following statements:

	Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
1. Technology gives me greater control over my daily work activities	☐**1**	☐**2**	☐**3**	☐**4**	☐**5**
2. Products and services that use the newest technologies are much more convenient to use	☐**1**	☐**2**	☐**3**	☐**4**	☐**5**
3. I prefer to use the most advanced technology available	☐**1**	☐**2**	☐**3**	☐**4**	☐**5**
4. Technology makes me more efficient in my occupation	☐**1**	☐**2**	☐**3**	☐**4**	☐**5**
5. I keep up with the latest technological developments in my areas of interest	☐**1**	☐**2**	☐**3**	☐**4**	☐**5**
6. I find myself having fewer problems than other people in making technology work for me	☐**1**	☐**2**	☐**3**	☐**4**	☐**5**
7. I am always open to learn about new and different technologies	☐**1**	☐**2**	☐**3**	☐**4**	☐**5**
8. It is easy to learn how to use technology	☐**1**	☐**2**	☐**3**	☐**4**	☐**5**
9. Overall, I find the technology useful for any task I need to accomplish	☐**1**	☐**2**	☐**3**	☐**4**	☐**5**
10. I think it would be very good to use data mining technology for analysing accounting data in addition to current methods.	☐**1**	☐**2**	☐**3**	☐**4**	☐**5**

- **Data Mining Technologies Implementation**

Adopters of Data Mining: Companies that have implemented data mining tools or currently implementing any data mining software.

Data Mining tools: Software, which used to find patterns and regularities in sets of data (for example, Clementine, Enterprise Miner, Intelligent Miner, Darwin, Scenario, Knowledge SEEKER, Oracle9i Data MiningTM, etc).

1. Based on the definition, does your company utilise any data mining tools?

☐1 Yes, please specify_____
☐2 No, never used data mining tools (*please go to question 4)*
☐3 Don't know *(Please go to question 5)*

2. For how many years has your company implemented data mining technologies?

☐1 Don't know
☐2 Less than 1 year
☐3 1 to less than 2 years
☐4 more than 2 years

3. How important are the following factors in influencing your company's decision to employ data mining.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1. Compatibility of software with existing operating systems	☐1	☐2	☐3	☐4	☐5
2. Full support from top management	☐1	☐2	☐3	☐4	☐5
3. Effective and adequate training for staff	☐1	☐2	☐3	☐4	☐5
4. A sufficient financial resources	☐1	☐2	☐3	☐4	☐5

Please skip question 4 and continue with question 5.

4. If your company is NOT implementing any data mining tools, please answer the following questions.

Please indicate the degree to which you agree with the following reasons for **NOT** implementing data mining in your company:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1. Satisfied with current analysis method	☐1	☐2	☐3	☐4	☐5
2. Lack of expertise to implement data mining	☐1	☐2	☐3	☐4	☐5
3. Lack of awareness about data mining	☐1	☐2	☐3	☐4	☐5
4. Costly to implement new technology	☐1	☐2	☐3	☐4	☐5
5. Lack of top management support	☐1	☐2	☐3	☐4	☐5
6. Difficult to select appropriate software	☐1	☐2	☐3	☐4	☐5
7. Too complex and time-consuming	☐1	☐2	☐3	☐4	☐5
8. Lack of management policies	☐1	☐2	☐3	☐4	☐5
9. Having more pressing problems	☐1	☐2	☐3	☐4	☐5

5. The following questions explore your company's attitude toward adopting data mining. It does not matter if your company has implemented data mining or not. The questions are about your company's INTENTION to adopt data mining technology.

13.1 Does your company intend to adopt data mining?	No intent to adopt	Little intent to adopt	Moderate intent to adopt	Definite intend to adopt	Don't know
	☐1	☐2	☐3	☐4	☐5
13.2 If your company intends to adopt data mining, how soon do you anticipate that it will be operationally implemented?	Less than 12 months	12 to 18 months	18 to 24 months	More than 24 months	No plans to adopt
	☐1	☐2	☐3	☐4	☐5

If there is anything else that you would like to tell us about the implementation of data mining technologies in accounting information systems, please use the space provided below.

In order to follow up issues in this investigation and to improve the quality of my data. I'm hoping to interview some of the respondents to this questionnaire, probably in September 2011. If you are willing to be interviewed, would you please fill in the form below:

Your Name: _____

Address: _____

Appendix 1.2: The study information sheet and questionnaire- Arabic version

جامعة تسمانيا
كلية المحاسبة

ورقة المعلومات للمشارك

بحث العلوم الإجتماعية/ الدراسات الإنسانية

" تبني برامج التنقيب عن البيانات ضمن نظم المعلومات المحاسبية في الشركات العامة المسجلة في الأردن"

الدعوة

انت مدعو لتشارك في دراسة بحثية عن تبني برامج التنقيب عن البيانات ضمن نظم المعلومات المحاسبية، حيث يدرس هذا البحث أساليب الإدارة في سياق دول عربية نامية من الناحية التكنولوجية ومن ضمنها الأردن. ويقدم رؤىء ً نظرية وعملية لفهم الطبيعة المتنوعة والمتغيرة لأساليب الإدارة، وبالإضافة لذلك، يسعى هذا البحث لمعرفة اتجاهات المدراء بالنسبة لتكنولوجيا المعلومات (IT) وتبني برامج التنقيب عن البيانات (DM) والعلاقة بين خصائص ديموغرافية معينة، تشمل: العمر، الجنس، المستوى التعليمي، الخبرة الإدارية وطول فترة الإدارة واتجاهات المدراء نحو تكنولوجيا المعلومات وتبني برامج التنقيب عن البيانات.

ينفذ هذه الدراسة الطالب أسل العودات المرشح لنيل درجة الدكتوراة في المحاسبة من قسم المحاسبة ، كلية إدارة الأعمال، جامعة تسمانيا وتحت إشراف:

الأستاذ المشارك تريفور ويلمس هرست، نائب رئيس كلية المحاسبة

الدكتور ويليام ماغوري، استاذ محاضر في كلية المحاسبة

1. ماهو الهدف من هذه الدراسة

إن الهدف من هذه الدراسة هو التحقق من مدى الإستعداد لتبني تكنولوجيا المعلومات والتنقيب عن البيانات ضمن نظم المعلومات المحاسبية في الشركات العامة المدرجة في بلد نام، وتحديداً الأردن. سوف تبحث هذه الدراسة العلاقة بين أساليب الإدارة السائدة في الشركات العامة المدرجة في الأردن واتجاهات المدراء نحو تكنولوجيا المعلومات والتنقيب عن البيانات.

2. لماذا تمت دعوتي للمشاركة في هذه الدراسة ؟

انت مؤهل للمشاركة في هذه الدراسة، حيث تستهدف هذه الدراسة مدراء المحاسبة والتدقيق، وموظفي تكنولوجيا المعلومات في أقسام المحاسبة والتدقيق. وقد تم اختيار هذه العينة كعينة مستهدفة لأنه يعتقد أنهم يمثلون الأطراف المؤثرة في نظم المعلومات المحاسبية ضمن الشركات العامة المسجلة، ومن المتوقع ان يملكوا فهماً عميقاً لتكنولوجيا المعلومات ضمن المؤسسة كونهم يمثلون الأطراف الرئيسة في استخدام هذه التكنولوجيا من أجل المصلحة الأفضل للمؤسسة.

3. ماذا تتضمن هذه الدراسة؟

من أجل ان اتمكن من جمع المعلومات، أود دعوتكم للمشاركة لتكونوا جزءاَ من مراحل الدراسة، وآمل أن تخصصوا حوالي 30 دقيقة للمشاركة في هذا الإستبيان. بعد قراءتكم لهذه الدعوة، أرغب بان اطلب اليكم قراءة ورقة المعلومات المرفقة في ملف الإستبيان. إذا رغبت بالمشاركة في هذا الإستبيان، الرجاء قراءة تعليمات الإستبيان المتوفرة في الصفحة الأولى منه. ثم تعبئة الإستبيان متبعاً التعليمات، حيث يقسم هذا الإستبيان إلى ثلاثة اجزاء. الجزء الاول سيكون مخصصا للمعلومات العامة عن خلفيتك بهذه الشركة، الجزء الثاني سيكون مخصصا لنظام المعلومات المحاسبية في شركتك، والجزء الأخير سيكون مخصصا لتبني نظام التنقيب عن البيانات.

عند اتمامك لهذا الأستبيان الرجاء وضعه بالمغلف المرفق والمخصص لأسترجاع الأستبيانات. هذه المغلفات لا يمكن تحديدها، لذا ردودك على هذا الأستبيان ستكون مجهولة المصدر.

الرجاء الانتباه بأن موافقتك على تعبئة هذا الأستبيان تعني موافقتك على الأشتراك بهذه الدراسة. من المهم ان تدرك ان مشاركتك في هذه الدراسة هو عمل تطوعي، حيث يسرنا ان تشارك ولكننا نحترم حقك برفض المشاركة. وإذا قررت التوقف عن المشاركة في أي وقت فلك ذلك دون الحاجة لتقديم توضيح حول قرارك.
ستعامل حميع المعلومات بسرية تامة وسوف لن يستخدم اسمك في أي شيء منشور ومنبثق عن هذه الدراسة. سيحفظ البحث لمدة خمس سنوات في خزانة محكمة الأغلاق في مكتب كلية المحاسبة في جامعة تسمانيا، فرع لانسيستون. وبعد مرور الخمس سنوات من تاريخ نشر الدراسة، فإن جميع البيانات المكتوبة والوثائق الورقية الموجودة في خزانة مغلقة في كلية المحاسبة وحاكمية الشركات والموجودة في مبني لانسيستون سوف تمزق. أما النسخة الحاسوبية من البيانات المخزنة في جهاز الحاسوب الخاص بالباحث والموجود في غرفة رقم A261 بناية D سوف تعالج من قبل طاقم تكنولوجيا المعلومات لمحو البيانات حال إنهاء برنامج الدكتوراة.

4. هل هناك فوائد محتملة من المشاركة في هذه الدراسة؟
بإختصار فإنه يتوقع ان يساعد البحث كبار مدراء اقسام المحاسبة والتدقيق وموظفي تكنولوجيا المعلومات ضمن هذه الدوائر في الشركات العامة المسجلة لإكتساب معرفة أفضل بالمسائل المتعلقة بتطبيق واستخدام تكنولوجيا المعلومات وتنقيب البيانات في مجال نظم المعلومات المحاسبية. وبالإضافة لذلك يتوقع ان يفيد البحث كلاً من الباحثين والعاملين في مجال المحاسبة والتدقيق.
حيث يمكن للباحثين الإستفادة عن طريق تطبيق النموذج التصوري الذي تم تطويره في هذه الدراسة البحثية في إجراء أبحاث مماثلة في إطار مؤسسي غير قطاع الشركات العامة المدرجة، وكذلك في إجراء بحث يعزز النموذج بدراسة مظاهر مختلفة منه في سياق استراتيجي محدد.
بينما يمكن للعاملين الإستفادة بتطبيق نتائج التحليل على جودة صنع القرار ضمن انظمة المعلومات المحاسبية من خلال إدراك الكيفية التي ستؤثر بها هذه القرارات على نتاج المؤسسة الإستراتيجي.

5. هل هناك اي مخاطر من المشاركة في هذه الدراسة؟
ليس هناك أي مخاطر محددة متوقعة من المشاركة في هذه الدراسة.

6. **ماذا أفعل إذا كان لدي أسئلة حول هذه الدراسة؟**
إذا كنت ترغب بمناقشة أي شيء يتعلق بهذه الدراسة ارجو ان لاتتردد في الإتصال بـ أسل العودات على رقم الهاتف -3-61+ 6324-3165 ، البريد الإلكتروني Asal.AlOdat@utas.edu.au
او الأستاذ المشارك تريفور ويلمسهرست – هاتف رقم : 3570-6324-3-61+، البريد الإلكتروني: Trevor.Wilmshurst@utas.edu.au
أذا كنت ترغب بالحصول على ملخص لهذه الدراسة الرجاء الأتصال بالسيد أسل العودات وهو سيقوم بتزويدك بهذا الملخص في حال انتهاء هذه الدراسة.
لقد تمت الموافقة على هذه الدراسة من قبل لجنة تسمانيا لأخلاقيات أبحاث العلوم الإجتماعية الإنسانية. إذا كان يساورك القلق او لديك شكوكاً حول طريقة إجراء هذه الدراسة، يمكنك الإتصال مع المدير التنفيذي لشبكة لجنة أخلاقيات البحوث الإنسانية في تسمانيا على هاتف رقم
7479-6226-3-61+ او على بريد الكتروني human.ethics@utas.edu.au.

المدير التنفيذي هو الشخص المعين لتلقي الشكاوى من المشاركين في الأبحاث.
ستحتاج ان تقتبس H11834.

شكراً لتخصيصكم وقتاً لأخذ هذه الدراسة بعين الإعتبار.
يمكنكم الإحتفاظ بورقة المعلومات هذه.

جامعة تسمانيا

كلية المحاسبة

تعليمات تعبئة الإستبيان

تبني برامج التنقيب عن البيانات ضمن نظم المعلومات المحاسبية في الشركات العامة المسجلة في الأردن

التعليمات:

يتضمن هذا الإستبيان ثلاثة أجزاء: يهدف الجزء الأول منه إلى التعرف على معلومات عامة عنك ضمن مؤسستك، بينما يسعى الجزء الثاني إلى التعرف على أسلوب الإدارة المتبع من قبلك، ويشير الجزء الأخير منه إلى مدى الجاهزية لتبني برامج التنقيب عن البيانات.

نقدر لكم مساهمتكم في الإجابة على هذا الإستبيان.

لمساعدتكم في الإجابة، تم تعريف العديد من المصطلحات المستخدمة لبيان كيفية استخدامها وماذا تعني في هذه الدراسة.

نظم المعلومات المحاسبية (AIS): هو النظام الذي يسجل العمليات الحسابية ويعالجها ضمن وحدات وظيفية مثل: الحسابات المدفوعة، الحسابات المستلمة، الرواتب وسجل الميزانية.

التنقيب عن البيانات: (DM): هو مصطلح يشمل نطاقاً من التقنيات التي تعمل على الإكتشاف الفعال لمعلومات غاية في الأهمية لكنها غير ظاهرة لوجودها ضمن كم هائل من البيانات. وبالأساس فإن تقنية التنقيب عن البيانات تعتمد على تحليل البيانات باستخدام برامج حاسوبية لإيجاد انماط وتراتيب في مجموعة البيانات لتعزيز عملية اتخاذ القرار ضمن الشركات.

أدوات التنقيب عن البيانات: برامج حاسوبية تستخدم لإيجاد انماط وتراتيب في مجموعة من البيانات مثل:

Clementine, Enterprise Miner, Intelligent Miner, Darwin, Scenario, Knowledge SEEKER, Oracle9i Data MiningTM, etc).

المتبنون لبرامج التنقيب عن البيانات: هم المؤسسات التي قامت باستخدام برامج التنقيب عن البيانات أو التي تطبق حالياً أي من برامج التنقيب عن البيانات.

الجزء الأول: معلومات عامة

الرجاء وضع علامة ✓ في المربع المناسب

1. ماهي الفئة العمرية التي تنتمي لها

1. ☐ أقل من 25 عاماً
2. ☐ 25- 29
3. ☐ 30- 34
4. ☐ 35 – 39
5. ☐ 40 – 44
6. ☐ 45- 49
7. ☐ 50- 54
8. ☐ 55- 59
9. ☐ + 59

2. كم مضى على عملك مع الشركة

1. ☐ أقل من خمس سنوات
2. ☐ 5- 10
3. ☐ 11- 15
4. ☐ 16- 20
5. ☐ أكثر من 20 عاماً

3. الجنس

1. ☐ ذكر
2. ☐ أنثى

4. المستوى التعليمي:

1. ☐ الثانوية العامة
2. ☐ الدبلوم
3. ☐ البكالوريوس
4. ☐ الماجستير
5. ☐ الدكتوراة
6. ☐ غير ذلك، الرجاء التحديد.....

5. كم مضى على تسلمك منصباً قيادياً:

1. ☐ أقل من خمس سنوات
2. ☐ 5- 10
3. ☐ 11 – 15
4. ☐ 16- 20
5. ☐ أكثر من 20 عاماً

6. كم عدد الموظفين الذين ترأسهم حالياً؟ .....

الجزء الثاني: أنماط الإدارة

فيما يلي مجموعة من الآراء التي صممت لتسمح لك بابداء مدى توافقك أو عدمه مع ماهو مطروح. الرجاء وضع علامة (X) في الفراغ الموجود تحت الكلمة الأقرب لمدى موافقتك أو عدمها على الآراء المطروحة.

الرأي	لاأوافق بشدة	لاأوافق	محايد	أوافق	أوافق بشدة
1. في هذه المؤسسة، تتخذ القرارات على أساس من التوافق بين الإدارة وطاقم العمل.					
2. أنا من يتخذ القرار النهائي دائماَ، وأوجه الموظفين لتطبيق ذلك القرار.					
3. أحب ان أشارك صلاحيات السلطة المنوطة بي مع المرؤسيين لدي.					
4. أحدد المهام والزمن اللازم لتنفيذها، وأعمل على التأكد من قيام الموظفين بها، حتى وإن كان ذلك سيقلل من شعبيتي.					
5. أؤمن أن الإبداع والطرق المبتكرة لحل المشكلات يجب أن يكافأ.					
6. أؤمن بعمل الموظفين والإدارة معاً على أساس من التعاون لتحقيق أهداف المؤسسة.					
7. أشعر بالضيق إذا لم أستطع اقناع الموظفين بأن القرارت التي اتخذتها هي الأفضل.					
8.إن مصدر سلطتي مستمد من قوانين وتشريعات المؤسسة.					
9. إن مصدر سلطتي مستمد من معرفتي بعمل ونشاطات المؤسسة.					
10.أحاول الحصول على ولاء واحترام طاقم العمل لدي من خلال استخدام مهاراتي ومعرفتي في العمل.					
11. أسعى للعمل بانسجام مع طاقم العمل لدي.					

الرأي	لاأوافق بشدة	لاأوافق	محايد	أوافق	أوافق بشدة
12.أشعر بالرضا لجعل الموظفين يتحملون مسؤولية اتخاذ قرارات مهمة ضمن مهامهم الوظيفية.					
13. يجب اتباع قواعد وإجراءات المؤسسة قبل اتخاذ القرارات المهمة.					
14. عند حدوث شيء جديد، أناقش مع المسؤولين الكبار كيف سيؤثر ذلك على الشركة والعمل الجاري تنفيذه.					
15.انا على استعداد لتفويض مهامي لغيري من الموظفين من أجل تطبيق إجراء أو طريقة حديثة.					
16.استمع لآراء الموظفين حول العمل وآخذها بعين الإعتبار.					
17. أعتقد أن هذه المؤسسة قادرة على تغيير إجراءاتها الإدارية وبسرعة، وإعادة توزيع مصادرها للقيام بنشاطات جديدة لمواكبة التغييرات في البيئة التشغيلية.					
18. أعتقد أنه يجب تشجيع الموظفين على الإستجابة للتحديات بشكل خلاق.					
19. أؤمن بالمشاورات المكثفة مع الموظفين قبل اتخاذ اي قرار اداري، لكني احتفظ بالحق في اتخاذ القرار من جانب واحد.					
20.أسمح للموظفين بتحديد ما يلزم اجراؤه وكيفية القيام بذلك.					
21. أقوم بفرض وجهة نظري عوضاً عن التفاوض على حل وسط ،عند اختلافي مع الموظفين حول مسألة ما.					
22.أتقبل اختلاف الرأي وأحاول خلق حوار حول المسائل لايجاد حلول.					
23. لدي التزام صارم حيال آرائي الشخصية					

الرأي	لاأوافق بشدة	لاأوافق	محايد	أوافق	أوافق بشدة
24. احرص على تشجيع العمل بروح الفريق.					
25. عند اتخاذ القرارات، احصل على المعلومات التي اريدها وأدرسها، ثم أقوم شخصياً باتخاذ قرار حازم وسريع.					
26. عند اتخاذ قرار، اكرس وقتاً كبيرا لاقناع الموظفين بقبول وجهة نظري.					
27. أخبر الموظفين ماعليهم عمله وكيفية اجراء ذلك.					
28. يبدأ التخطيط المستقبلي على مستوى القسم.					
29. إن مسؤوليتي تجاه احتياجات المرؤوسين لدي يوازي من حيث الأهمية انجاز العمل.					
30. إن مسؤوليتي تجاه احتياجات المرؤوسين لدي يوازي من حيث الأهمية العمل كفريق واحد.					
31. لا أقوم بفرض أي قرار، إذا كان ذلك سيؤدي لمضايقة/ازعاج الموظفين بشكل جدي.					
32. يعرف الموظفين لدي عملهم أكثر مني، لذا أسمح لهم باتخاذ القرارات المتعلقة بعملهم.					
33. يتم تشجيع الموظفين في هذه المؤسسة على مراجعة السياسات القائمة وطرق العمل، وعلى الإبتكار وتحدي التفكير التقليدي.					
34. استخدم العقاب أحياناً حتى يتم انجاز العمل بالطريقة التي أريدها.					
35.أحب العمل مع الموظفين عن قرب للقيام بالأعمال والأنشطة التي تقوم بها هذه الشركة.					

الجزء الثالث: توجهات المدراء بشأن تبني برامج التنقيب عن البيانات ضمن نظم المعلومات المحاسبية

إن الغرض من هذا الجزء هو جمع المعلومات حول آرائكم حول تبني برامج التنقيب عن البيانات.
الرجاء وضع **(x)** تحت الكلمة الأقرب لموافقتك من عدمها على الرأي المطروح.

نظم المعلومات المحاسبية (AIS): هو النظام الذي يسجل العمليات المحاسبية ويعالجها ضمن وحدات وظيفية مثل: الحسابات المدفوعة، الحسابات المستلمة، الرواتب وسجل الميزانية.

1- ماهو مدى رضاك عن نظم المعلومات المحاسبية الحالية لديك:

1. ☐ راض جداً، لاتحتاج إلى أي تحسين

2. ☐ راض إلى حد معقول، على الرغم من الحاجة لبعض التحسينات

3. ☐ تحتاج إلى تحسين، لكنها لازالت صالحة للأستعمال

4. ☐ غير راض، يحتاج النظام إلى تعديلات جوهرية

2- هل تستخدم الدائرة لديك أي برامج حاسوبية معينة للمساعدة في استخراج البيانات؟

1. ☐ نعم **2.** ☐ لا **3.** ☐ لا أعرف

3- الرجاء تحديد مدى موافقتك مع أهمية التأثيرات التالية على أداء المؤسسة:

في العمود 1 : الرجاء تقييم أهمية كل عامل في ضمان جودة انظمة المعلومات المحاسبية بناءً على رأيك وتصورك الخاص

في العمود 2 : الرجاء تقييم الأداء الفعلي لكل من هذه العوامل بناءً على رأيك وتصورك الخاص

	الأهمية					الأداء				
	أوافق بشدة	أوافق	محايد	لا أوافق	لا أوافق بشدة	ممتاز	جيد جداً	جيد	مقبول	ضعيف
1.3. **دقيقة:** تتفق البيانات المسجلة مع القيمة الفعلية.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2.3. **محدثة :** البيانات المخزنة في النظام الخاص بك محدثة .	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3.3. **ثابتة**: دقة البيانات المسخرجة ثابت في جميع الحالات.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

- **الإستعداد لتبني برامج التنقيب عن البيانات**

التنقيب عن البيانات هو مفهوم يشمل مجموعة من التقنيات للإكتشاف الفعال لهذه البيانات القيمة الغير واضحة والموجودة ضمن كم هائل من البيانات. وبالأساس فإن التنقيب عن البيانات يهتم بتحليل البينات وباستخدام برامج حاسوبية لإيجاد انماط وتراتيب في مجموعة البيانات والذي يؤدي لتسريع عملية اتخاذ القرار في الشركات.

1. هل يستخدم مصطلح التنقيب عن البيانات في مؤسستك؟ 1. ☐ نعم 2. ☐ لا 3. ☐ لاأعرف

2. هل هناك مصطلح آخر يتخدم للدلالة على تنقيب البيانات؟ 1. ☐ نعم 2. ☐ لا 3. ☐ لاأعرف

إذا كانت الإجابة بنعم ، الرجاء التحديد _____

3. الأستعداد لإستخدام التكنولوجيا – تسعى هذه الأسئلة للحصول على فهم مدى استعدادك لإستخدام التكنولوجيا وخاصة تكنولوجيا التنقيب عن البيانات.

الرجاء تحديد إلى أي مدى توافق على هذه الآراء:

	لاأوافق بشدة	لااوافق	محايد	أوافق	أوافق بشدة
1. تمنحني التكنولوجيا سيطرة اكبر على نشاطات العمل اليومية.	☐	☐	☐	☐	☐
2. إن المنتوجات والخدمات التي تستخدم التكنولوجيا الأحدث هي أكثر راحة لنا لإستخدامها.	☐	☐	☐	☐	☐
3.أفضل استخدام أحدث أنواع التكنولوجيا المتوفرة على الإطلاق.	☐	☐	☐	☐	☐
4.إن التكنولوجيا تجعلني أكثر فاعلية في وظيفتي.	☐	☐	☐	☐	☐
5.أبقى على اطلاع دائم على آخر تطورات التكنولوجيا المتوفرة ضمن مجال إهتمامي .	☐	☐	☐	☐	☐
6. عند جعل التكنولوجيا تعمل لصالحي، أواجه مشاكل أقل مما يواجهه الآخرون.	☐	☐	☐	☐	☐
7.أبقى دائماً مهتماً ومنفتحاً لتعلم تكنولوجيا حديثة ومختلفة.	☐	☐	☐	☐	☐
8.من السهل تعلم استخدام التكنولوجيا.	☐	☐	☐	☐	☐
9.بشكل عام، أجد ان التكنولوجيا مفيدة لأي مهمة أريد تنفيذها.	☐	☐	☐	☐	☐
10. أعتقد انه بالإضافة للطرق المتبعة حالياً ، فإن استخدام برامج التنقيب عن البيانات لتحليل بيانات الحسابات سيكون جيداً.	☐	☐	☐	☐	☐

- **تطبيق تكنولوجيا التنقيب عن البيانات**

المتبنون لتقنيات التنقيب عن البيانات: هي المؤسسات التي طبقت استخدام أدوات تقنية التنقيب عن البيانات أو تطبق حالياً أي من برامج التنقيب.
أدوات برامج استخراج البيانات **:** برامج حاسوبية تستخدم لإيجاد انماط وتراتيب في مجموعة من البيانات مثل:

(Clementine, Enterprise Miner, Intelligent Miner, Darwin, Scenario, Knowledge SEEKER, Oracle9i Data MiningTM, etc).

1- بناءً على التعريف، هل تستخدم مؤسستك أي من أدوات التنقيب عن البيانات:

1. ☐ نعم، يرجى التحديد _____

2. ☐ لا، لم يسبق لنا أبداً استخدام برامج التنقيب عن البيانات، ***(الرجاء الإنتقال إلى سؤال رقم 4)***

3. ☐ لا أعرف، ***(الرجاء الإنتقال إلى سؤال رقم 5)***

2- متى بدأت مؤسستك باستخدام برامج التنقيب عن البيانات؟

1. ☐ لاأعرف

2. ☐ أقل من سنة

3. ☐ سنة إلى أقل من سنتين

4. ☐ أكثر من سنتين

3- ما مدى أهمية العوامل التالية في التأثير على قرار مؤسستك لتبني برامج التنقيب عن الببيانات

	لا أوافق بشدة	لا أوافق	محايد	أوافق	أوافق بشدة
1. توافق برنامج التنقيب عن البيانات مع البرامج العاملة حالياً	☐	☐	☐	☐	☐
2. الدعم الكامل من الإدارة العليا	☐	☐	☐	☐	☐
3. التدريب الفعال والملائم للموظفين	☐	☐	☐	☐	☐
4. توفر الموارد المالية الكافية	☐	☐	☐	☐	☐

الرجاء ترك/ تجاهل السؤال الرابع (4) والإنتقال إلى السؤال الخامس (5)

4- إذا كانت مؤسستك <u>لا تطبق</u> أي من برامج التنقيب عن البيانات، الرجاء الإجابة عن الأسئلة التالية.

الرجاء تحديد إلى أي مدى توافق مع الأسباب التالية **<u>لعدم</u>** تطبيق برامج التنقيب عن البيانات في مؤسستك

	أوافق بشدة	أوافق	محايد	لاأوافق	لاأوافق بشدة
1.الرضى عن طريقة التحليل المتبعة حالياً	☐	☐	☐	☐	☐
2.نقص الخبرة لتطبيق برامج التنقيب عن البيانات	☐	☐	☐	☐	☐
3. نقص المعرفة ببرامج التنقيب عن البيانات	☐	☐	☐	☐	☐
4. كلفة تطبيق برامج جديدة	☐	☐	☐	☐	☐
5. عدم الدعم الكافي من الإدارة العليا	☐	☐	☐	☐	☐
6.صعوبة إختياربرامج حاسوبية مناسبة	☐	☐	☐	☐	☐
7. البرامج معقدة وتستهلك وقتاً	☐	☐	☐	☐	☐
8. الإفتقار إلى سياسات إدارية	☐	☐	☐	☐	☐
9. وجود مشاكل أكثر الحاحاً	☐	☐	☐	☐	☐

5- تسعى الأسئلة التالية إلى معرفة مدى استعداد مؤسستك لإعتماد برامج التنقيب عن المعلومات، لايهم هنا إذا كانت مؤسستك قد اعتمدت برامج التنقيب عن البيانات او لم تعتمدها.

1. هل تنوي مؤسستك إعتماد برامج التنقيب عن البيانات؟	**لايوجد نية للإعتماد**	**ميل قليل للإعتماد**	**ميل معتدل للإعتماد**	**ميل مؤكد للإعتماد**	**لاأعرف**
	1. ☐	**2.** ☐	**3.** ☐	**4.** ☐	**5.** ☐
2. إذا كانت مؤسستك تنوي إعتماد التنقيب عن البيانات، ماهي أقرب فترة زمنية تتوقعونها للبدء بذلك عملياً؟	**أقل من 12 شهراً**	**مابين 12- 18 شهراً**	**مابين 12- 24 شهراً**	**أكثر من 24 شهراً**	**لايوجد خطط لذلك**
	1 . ☐	**2.** ☐	**3.** ☐	**4.** ☐	**5.** ☐

إذا كان لديك أي شيء آخر تود إخبارنا به بخصوص تبني برامج استخراج البيانات ضمن انظمة المعلومات المحاسبية، الرجاء استخدام الفراغ المخصص لذلك.

حتى أتمكن من متابعة المعلومات الواردة في هذا الأستبيان ولتمكيني من تحسين نوعية بياناتي، فأني أأمل باجراء بعض المقابلات مع بعض من مشتركي هذه الدراسة خلال شهر أيلول بأذن الله. أذا كنت ترغب بأن تتم مقابلتك، الرجاء تعبئة الفراغ أدناه.

الأسم:----------
العنوان:----------
البريد الألكتروني:----------
الهاتف:----------

Appendix Two: Interview covering letter

Appendix 2.1: Interview covering letter- English version

UNIVERSITY OF TASMANIA

School of Accounting and Corporate Governance

Interview Covering letter

Dear «FirstName»

My name is Asal Al-Odat and I am currently enrolled in a Doctoral degree in Accounting at the University of Tasmania under the supervision of Associate Professor Trevor Wilmshurst. I am conducting research into adoption of data mining technology (DM) within accounting information systems (AIS) in publicly listed companies in Jordan. The intent of this interview is to investigate the implementation of and the readiness to adopt IT and DM technology within AIS in publicly listed companies in a developing nation, specifically Jordan. This interview is presented in 3 sections; the first section seeks basic information about your background within your company. The second section seeks basic information about accounting information system in your company. And the final section relates to data mining readiness and the implementation.

In your response to the mail survey you indicated a willingness to participate in the interview stage of the study. This interview is a crucial part of my study, as it will improve the richness of the quality of the results within this study. Views and opinion from your department would be very important to this research. We would now like to ask whether you are still willing to participate. It is proposed to hold interviews during September 2011, could you indicate your availability on <date> 2011 at <time> please or could you indicate a suitable date and time please. It is envisaged that the interview would be conducted on your premises and would take approximately 45 minutes - 1 hour in length.

Participation in this process is entirely voluntary. If you do participate in this study, at any time you can withdraw without effect or explanation and should you wish, also withdraw any data your organisation has supplied to date. It is anticipated that the interview will be fully audio recorded. You will be given the opportunity to review and amend any material including any transcripts from these recordings.

As a research student at the University of Tasmania, I am bound by the University's strict rules of confidentiality. There will be no attempt made to identify your organisation in any published material and all raw data collected from this study will be stored at the School of Accounting and Corporate Governance in Launceston campus for a period of five years. At the expiry of this five year period, the data will be destroyed in line with established University procedures. Subject to the University's

copyright, I would be most happy to give you access to my findings relating to your firm and a copy of my thesis after it has been examined.

This study has been approved by the Tasmanian Social Science Human Research Ethics Committee, approval number H11834 If you have concerns or complaints about the conduct of this study, you should contact the Executive Officer of the HREC (Tasmania) Network on +61-3-6226-7479 or email human.ethics@utas.edu.au. The Executive Officer is the person nominated to receive complaints from research participants.

If you wish to participate in this process, please sign the attached consent form.

Yours sincerely

Asal Al-Odat
PhD Candidate
Student ID 084024
School of Accounting and Corporate Governance
University of Tasmania

Co-signed:

Trevor Wilmshurst
Assoc Prof /Deputy Head
School of Accounting and Corporate governance
University of Tasmania

Appendix 2.2: Interview covering letter- Arabic version

جامعة تسمانيا

كلية المحاسبة

عزيزي (الإسم الأول)

اسمي أسل العودات، وأنا حالياً طالب مسجل لنيل درجة الدكتوارة في المحاسبة من جامعة تسمانيا تحت اشراف الأستاذ المشارك تريفور ويلمسهرت. إجري بحثا عن تبني تكنولوجيا التنقيب عن البيانات ضمن نظم المعلومات المحاسبية في الشركات العامة المدرجة في الأردن. الهدف من هذه المقابلة هو التحقق من مدى جاهزية الشركات العامة المدرجة في الأردن لتبني وتطبيق تكنولوجيا التنقيب عن البيانات ضمن نظم المعلومات المحاسبية في بلد نام وتحديداً الأردن. تقسم هذه المقابلة إلى ثلاثة أقسام : يسعى القسم الأول للحصول على معلومات عن خلفيتك في شركتك، فيما يسعى القسم الثاني إلى الحصول على معلومات عن نظم المعلومات الحاسوبية في شركتك، و يرتبط الجزء الأخير من المقابلة بمدى الجاهزية لتطبيق برامج التنقيب عن البيانات.

في ردك على البريد الإلكتروني، أبديت استعداداً للمشاركة في المرحلة التي تتضمن المقابلة من هذه الدراسة، حيث تعتبر هذه المقابلة جزءاً حاسماً سيؤدي إلى اثراء نوعية النتائج ضمن هذه الدراسة. إن الأراء ووجهات النظر المقدمة من دائرتك سوف تكون مهمة جداً لهذا البحث. لذا نستغل هذه الفرصة لسؤالك مجدداً فيما إذا كنت لازلت ترغب بالمشاركة، حيث من المتوقع أن تجرى المقابلات خلال شهر أيلول 2011، فيرجى منك الإشارة إلى تواجدك من أجل المقابلة بتاريخ ..... عند الساعة.....، أو يمكنك التفضل باقتراح تاريخ ووقت يناسبك، حيث يتوخى الباحث اجراء المقابلة في مقرك ومن المتوقع أن تستغرق المقابلة مابين 45 دقيقة إلى ساعة.

إن المشاركة في هذه الدراسة أمر إختياري بالكامل، ويحق لك الإنسحاب منها في أي وقت دون تأثير او تفسير، كما يحق لك، في حال رغبت بذلك، استرداد أي معلومات قدمتها دائرتك حتى ذلك التاريخ. ومن المتوقع أن يتم تسجيل المقابلة صوتياً بشكل كامل بحيث تعطى الفرصة لمراجعة وتعديل أي مادة بما فيها نصوص هذه التسجيلات.

وكطالب يجري بحثاً في جامعة تسمانيا، فإنني ألتزم بالقواعد الصارمة الخاصة بالسرية، بحيث لن يكون هناك أي محاولة لتمييز دائرتك في أي مادة منشورة، كما سيتم حفظ البيانات المجموعة من هذه الدراسة في كلية المحاسبة وحوكمة الشركات في حرم الجامعة في لاونسستن لمدة 5 سنوات، وعند انتهاء هذه المدة سيتم التخلص من البيانات وفقاً لإجراءات الجامعة المتبعة. وسيسعدني أن أزودكم بالنتائج الخاصة بشركتكم وبنسخة من أطروحة الدكتوراة بعد اقرارها على أن يخضع ذلكُ لحقوق التأليف والنشر الخاصة بالجامعة.

لقد تمت الموافقة على هذه الدراسة من قبل لجنة أخلاقيات البحوث الإجتماعية والإنسانية، رقم الموافقة H11834 إذا كان لديك أي قلق أو شكاوى بخصوص اجراء هذه الدراسة، فالرجاء الإتصال مع المسؤول التنفيذي للجنة الأخلاقيات (تسمانيا) هاتف -3-61+ 6226-7479 أو على البريد الإلكتروني .human.ethics@utas.edu.au ، حيث أن المسؤول التنفيذي هو الشخص المكلف باستلام الشكاوى من المشاركين بالأبحاث .

إذا أردت المشاركة في هذه الدراسة (المقابلة)، الرجاء توقيع نموذج الموافقة.

المخلص

أسل العودات

طالب مرشح لنيل درجة الدكتوارة

084024رقم الطالب:

كلية المحاسبة وحوكمة الشركات

جامعة تسمانيا

شارك في التوقيع

تريفور ويلمسهرت

استاذ مشارك/ نائب الرئيس

كلية المحاسبة وحوكمة الشركات

جامعة تسمانيا

Appendix Three: Consent form

Appendix 3.1: Consent form- English version

UNIVERSITY OF TASMANIA

School of Accounting and Corporate Governance

CONSENT FORM

Title of Project: **'The adoption of data mining technology within accounting information systems in publicly listed companies in Jordan'**

1. I have read and understood the 'Information Sheet' for this project.
2. The nature and possible effects of the study have been explained to me.
3. I understand that the study involves interview which likely to take approximately 1 to 1.5 hour and will focus on the adoption of data mining technology within accounting information systems.
4. I understand that all research data will be securely stored on the University of Tasmania premises for five years after publication and will be destroyed after this time.
5. Any questions that I have asked have been answered to my satisfaction.
6. I agree that research data gathered from me for the study may be published provided that I cannot be identified as a participant.
7. I understand that the researchers will maintain my identity confidential and that any information I supply to the researcher(s) will be used only for the purposes of the research.
8. I understand that the interview will be audio taped if I agree to do so, and I understand that I will have the opportunity to review and correct a transcript of my interview.
9. I agree to participate in this investigation and understand that I may withdraw at any time without any effect, and if I so wish may request that any data I have supplied to date be withdrawn from the research.

Name of Participant:

Signature: Date:

Statement by Investigator

☐ I have explained the project & the implications of participation in it to this volunteer and I believe that the consent is informed and that he/she understands the implications of participation

If the Investigator has not had an opportunity to talk to participants prior to them participating, the following must be ticked.

☐ The participant has received the Information Sheet where my details have been provided so participants have the opportunity to contact me prior to consenting to participate in this project.

Name of investigator _____

Signature of investigator _____ Date _____

Appendix 3.2: Consent form- Arabic version

جامعة تسمانيا

كلية المحاسبة

نموذج الموافقة

عنوان المشروع:" تبني برامج التنقيب عن البيانات ضمن نظم المعلومات المحاسبية في الشركات العامة المسجلة في الأردن"

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1. لقد قرأت واستوعبت (ورقة المعلومات) لهذا المشروع.

2. تم ايضاح طبيعة وتأثيرات الدراسة لي.

3. أدرك ان الدراسة تتضمن مقابلة والتي يمكن ان تستغرق مابين ساعة إلى ساعة ونصف، ومن المقترح أن تتم في أيلول 2011 وسوف تركز على تبني برامج التنقيب عن البيانات ضمن نظم المعلومات المحاسبية.

4. أدرك أن بيانات البحث سوف تحفظ وبشكل آمن في مرافق جامعة تسمانيا لمدة لاتقل عن خمس سنوات، وسوف يتم التخلص منها عندما لايكون هناك أي حاجة إليها.

5. لقد تمت الإجابة على كل سؤال طرح وبشكل مرضي.

6. أوافق على أن تنشر البيانات التي تم جمعها من أجل البحث شريطة ان لايتم التعرف علي هويتي كمشارك.

7. أدرك أن الباحثين سوف يحافظون على سرية هويتي، وأن جميع المعلومات التي سأزود الباحث /الباحثين بها سوف لن تستخدم لغير أغراض البحث العلمي.

8. أدرك أن المقابلة ستكون مسجلة صوتيا في حال موافقتي على ذلك، وكما وأدرك أنه ستتاح لي الفرصة لمراجعة وتصحيح نسخة مقابلتي.

9. أوافق على المشاركة في هذا البحث/ الإستقصاء، وأدرك انه يمكنني الإنسحاب في أي وقت دون أي تأثير، كما يمكنني أن أطلب إلغاء/سحب أي معلومات أعطيتها حتى تاريخه (تاريخ الإنسحاب من البحث).

اسم المشارك:

_____

التوقيع: التاريخ:

_____

تصريح /إفادة الباحث

☐ لقد قمت بشرح المشروع لهذا المتطوع والآثار المترتبة على المشاركة فيه ،كما أعتقد أن المشارك على دراية وأنه يدرك الآثار المترتبة على مشاركته.

إذا لم تتح الفرصة للباحث بالحديث مع المشاركين قبل مشاركتهم يجب وضع اشارة في المربع التالي:

☐ لقد استلم المشارك ورقة المعلومات حيث توجد معلومات للإتصال بي، بحيث تتاح الفرصة للمشارك للإتصال بي قبل موافقته على المشاركة في هذا المشروع.

اسم الباحث:_____

توقيع الباحث:_____

Appendix Four: Interview information sheet

Appendix 4.1: Interview information sheet - English version

UNIVERSITY OF TASMANIA

School of Accounting and Corporate Governance

PARTICIPANT INFORMATION SHEET- INTERVIEWS
SOCIAL SCIENCE/ HUMANITITES
RESEARCH

'The adoption of data mining technology within accounting information systems in publicly listed companies in Jordan'

Invitation

You are invited to participate in a research study into the adoption of data mining technology (DM) within accounting information systems (AIS), this research looks into the management styles within a technologically developing Arab countries context, including Jordan and provides some empirical and theoretical insights towards understanding the changing and diversifying nature of management styles. In addition, this research explores the managers' attitudes towards information technology (IT) and DM and the relationship between certain demographic characteristics, including age, gender, educational level, organisational experience and span of control and the managers' attitudes towards IT and DM.
The study is being conducted by Asal Al-Odat, a PhD candidate in Accounting, School of Accounting and Corporate Governance, Faculty of Business, University of Tasmania. Under the supervision of:
Associate Professor Trevor Wilmshurst, Deputy Head of School of Accounting.
Dr William Maguire, Senior Lecturer at School of Accounting.

And, Professor Robert Charles Clift Research Advisor in the School of Accounting and Corporate Governance, Faculty of Business, University of Tasmania, Australia.

1. What is the purpose of this study?

The purpose is to investigate the implementation of and the readiness to adopt IT and DM technology within AIS in publicly listed companies in a developing nation, specifically Jordan. The relationship between managerial styles prevailing in Jordanian publicly listed companies and the managers' attitudes towards IT and DM will be investigated in this research.

2. Why have I been invited to participate in this study?

You are eligible to participate in this study because this study targets senior manager in the finance/accounting area. You were chosen as a target respondent as it is believed you represent a major AIS stakeholder within your company and I would expect you to have a sound understanding of the information issues within your company.

3. What does this study involve?

In order for me to gather information, I would like to invite you to be a part of this study. It is envisaged that.

the interview would be conducted on your premises and would take approximately 45 minutes - 1 hour in length. This interview is presented in 3 sections; the first section seeks basic information about your background within company. Second section seeks basic information about accounting information system in your company. And the final section relates to data mining readiness and the implementation.

It is important that you understand that participation in this interview is entirely voluntary. If you do participate in this study, at any time you can withdraw without effect or explanation and should you wish, also withdraw any data your organisation has supplied to date. It is anticipated that the interview will be fully audio recorded. You will be given the opportunity to review and amend any material including any transcripts from these recordings. All information will be treated in a confidential manner. All of the research will be kept in a locked cabinet in the office of the School of Accounting and Corporate Governance, University of Tasmania, Launceston Campus for 5 years after publication. After this time, all written data and paper documents which have been stored will be shredded. The soft copy of all data stored in the researcher's computer which is located at Room A 261 Building D will be reformatted by IT staff to erase data once the doctorate program has been completed.

4. Are there any possible benefits from participation in this study?

In brief, this research is likely to help senior management in accounting and audit departments and the IT personnel within these departments in publicly listed companies, to obtain a better understanding of the issues of implementation and use of IT and DM technology within the area of the accounting information system. In addition, these contributions are expected to benefit both researchers and practitioners. Researchers can benefit by applying the conceptual model developed in this research study in the conduct of similar research in organisational settings other than the publicly listed companies sector and in the conduct of research extending the model and investigating different aspects of the model in more specific strategic contexts. Practitioners can benefit by applying the results of the analysis to their own accounting information system quality data decisions, with an understanding of how those decisions relate to the company's strategic outcomes.

5. Are there any possible risks from participation in this study?

There are no specific risks anticipated with participation in this study.

6. What if I have questions about this research?

If you would like to discuss any aspect of this study please feel free to contact either Asal Al-Odat on ph +61-3-6324-3165 (email: Asal.AlOdat@utas.edu.au) or Associate Professor Trevor Wilmshurst on ph +61-3-6324-3570 (email: Trevor.Wilmshurst@utas.edu.au) . Should you be interested in receiving a summary of the results of this survey please email Mr. Asal Al-Odat and this will be sent to you once the data is compiled.

This study has been approved by the Tasmanian Social Science Human Research Ethics Committee, approval number H11834 If you have concerns or complaints about the conduct of this study, you should contact the Executive Officer of the HREC (Tasmania) Network on +61-3-6226-7479 or email human.ethics@utas.edu.au. The Executive Officer is the person nominated to receive complaints from research participants.

Thank you for taking the time to consider this study. If you are happy to participate in this interview please sign the attached consent form.

This information sheet is for you to keep.

Appendix 4.2: Interview information sheet - Arabic version

جامعة تسمانيا

كلية المحاسبة

ورقة المعلومات للمشارك
بحث العلوم الإجتماعية/ الدراسات الإنسانية

" تبني برامج التنقيب عن البيانات ضمن نظم المعلومات المحاسبية في الشركات العامةالمسجلة في الأردن"

الدعوة

انت مدعو لتشارك في دراسة بحثية عن تبني برامج التنقيب عن البيانات ضمن نظم المعلومات المحاسبية، حيث يدرس هذا البحث أساليب الإدارة في سياق دول عربية نامية من الناحية التكنولوجية ومن ضمنها الأردن. ويقدم رؤىء نظرية وعملية لفهم الطبيعة المتنوعة والمتغيرة لأساليب الإدارة، وبالإضافة لذلك، يسعى هذا البحث لمعرفة اتجاهات المدراء بالنسبة لتكنولوجيا المعلومات (IT) وتبني برامج التنقيب عن البيانات (DM) والعلاقة بين خصائص ديموغرافية معينة، تشمل: العمر، الجنس، المستوى التعليمي، الخبرة الإدارية وطول فترة الإدارة واتجاهات المدراء نحو تكنولوجيا المعلومات وتبني برامج التنقيب عن البيانات.
ينفذ هذه الدراسة الطالب أسل العودات المرشح لنيل درجة الدكتوراة في المحاسبة من كلية المحاسبة ، كلية إدارة الأعمال، جامعة تسمانيا وتحت إشراف:
الأستاذ المشارك تريفور ويلمس هرست، نائب رئيس كلية المحاسبة
الدكتور ويليام ماغوري، استاذ محاضر في كلية المحاسبة
والبروفيسور روبرت تشارلز كلفت: استاذ مساعد في قسم المحاسبة، كلية ادارة الأعمال، جامعة تسمانيا، استراليا.

1. ماهو الهدف من هذه الدراسة

إن الهدف من هذه الدراسة هو التحقق من مدى الإستعداد لتبني تكنولوجيا المعلومات والتنقيب عن البيانات ضمن نظم المعلومات المحاسبية في الشركات العامة المدرجة في بلد نام، وتحديداً الأردن. سوف تبحث هذه الدراسة العلاقة بين أساليب الإدارة السائدة في الشركات العامة المدرجة في الأردن واتجاهات المدراء نحو تكنولوجيا المعلومات والتنقيب عن البيانات.

2. لماذا تمت دعوتي للمشاركة في هذه الدراسة ؟

انت مؤهل للمشاركة في هذه الدراسة، حيث تستهدف هذه الدراسة مدراء المحاسبة والتدقيق، وموظفي تكنولوجيا المعلومات في أقسام المحاسبة والتدقيق. وقد تم اختيار هذه العينة كعينة مستهدفة لأنه يعتقد بأنهم يمثلون الأطراف المؤثرة في نظم المعلومات المحاسبية ضمن الشركات العامة المسجلة، ومن المتوقع ان يملكوا فهماً عميقاً لتكنولوجيا المعلومات ضمن المؤسسة كونهم يمثلون الأطراف الرئيسة في استخدام هذه التكنولوجيا من أجل المصلحة الأفضل للمؤسسة.

3. ماذا تتضمن هذه الدراسة؟

من أجل ان اتمكن من جمع المعلومات، أود دعوتكم للمشاركة لتكونوا جزءاً من مراحل الدراسة، وآمل أن تخصصوا حوالي الساعة للمشاركة في هذه المقابلة.
هذه المقابلة ستكون مقسمة الى ثلاثة اجزاء، الجزء الاول سيكون مخصصا للمعلومات العامة عن خلفيتك بهذه الشركة، الجزء الثاني سيكون مخصصا لنظام المعلومات المحاسبية في شركتك، والجزء الأخير سيكون مخصصا لتبني نظام التنقيب عن

البيانات.

من المهم ان تدرك ان مشاركتك في هذه الدراسة هو عمل تطوعي، حيث يسرنا ان تشارك ولكننا نحترم حقك برفض المشاركة. وإذا قررت التوقف عن المشاركة في أي وقت فلك ذلك دون الحاجة لتقديم توضيح حول قرارك. كما من المهم ان تدرك أن المقابلة ستكون مسجلة صوتيا في حال موافقتك على ذلك، وكما من المهم ان تدرك أنك ستتاح لك الفرصة لمراجعة وتصحيح نسخة مقابلتك.
ستعامل جميع المعلومات بسرية تامة وسوف لن يستخدم اسمك في أي شيء منشور ومنبثق عن هذه الدراسة. سيحفظ البحث لمدة خمس سنوات في خزانة محكمة الأغلاق في مكتب كلية المحاسبة في جامعة تسمانيا، فرع لانسيستون. وبعد مرور الخمس سنوات من تاريخ نشر الدراسة، فإن جميع البيانات المكتوبة والوثائق الورقية الموجودة في خزانة مغلقة في كلية المحاسبة وحاكمية الشركات والموجودة في مبني لانسيستون سوف تمزق. أما النسخة الحاسوبية من البيانات المخزنة في جهاز الحاسوب الخاص بالباحث والموجود في غرفة رقم A261 بناية D سوف تعالج من قبل طاقم تكنولوجيا المعلومات لمحو البيانات حال إنهاء برنامج الدكتوراة.

4. هل هناك فوائد محتملة من المشاركة في هذه الدراسة؟

بإختصار فإنه يتوقع ان يساعد البحث كبار مدراء اقسام المحاسبة والتدقيق وموظفي تكنولوجيا المعلومات ضمن هذه الدوائر في الشركات العامة المسجلة لإكتساب معرفة أفضل بالمسائل المتعلقة بتطبيق واستخدام تكنولوجيا المعلومات وتنقيب البيانات في مجال نظم المعلومات المحاسبية. وبالإضافة لذلك يتوقع ان يفيد البحث كلاً من الباحثين والعاملين في مجال المحاسبة والتدقيق.
حيث يمكن للباحثين الإستفادة عن طريق تطبيق النموذج التصوري الذي تم تطويره في هذه الدراسة البحثية في إجراء أبحاث مماثلة في إطار مؤسسي غير قطاع الشركات العامة المدرجة، وكذلك في إجراء بحث يعزز النموذج بدراسة مظاهر مختلفة منه في سياق استراتيجي محدد.
بينما يمكن للعاملين الإستفادة بتطبيق نتائج التحليل على جودة صنع القرار ضمن انظمة المعلومات المحاسبية من خلال إدراك الكيفية التي ستؤثر بها هذه القرارات على نتاج المؤسسة الإستراتيجي.

5. هل هناك اي مخاطر من المشاركة في هذه الدراسة؟

ليس هناك أي مخاطر محددة متوقعة من المشاركة في هذه الدراسة.

6. ماذا أفعل إذا كان لدي أسئلة حول هذه الدراسة؟

إذا كنت ترغب بمناقشة أي شيء يتعلق بهذه الدراسة ارجو ان لاتتردد في الإتصال بـ أسل العودات على رقم الهاتف -3-61+ 6324-3165 ، البريد الإلكتروني Asal.AlOdat@utas.edu.au
او الأستاذ المشارك تريفور ويلمسهرست –هاتف رقم : 61-3-6324-3570+، البريد الإلكتروني: Trevor.Wilmshurst@utas.edu.au
أذا كنت ترغب بالحصول على ملخص لهذه الدراسة الرجاء الأتصال بالسيد أسل العودات وهو سيقوم بتزويدك بهذا الملخص في حال انتهاء هذه الدراسة.
لقد تمت الموافقة على هذه الدراسة من قبل لجنة تسمانيا لأخلاقيات أبحاث العلوم الإجتماعية الإنسانية. إذا كان يساورك القلق او لديك شكوكاً حول طريقة إجراء هذه الدراسة، يمكنك الإتصال مع المدير التنفيذي لشبكة لجنة أخلاقيات البحوث الإنسانية في تسمانيا على هاتف رقم
+61-3-6226-7479 او على بريد الكتروني human.ethics@utas.edu.au.

المدير التنفيذي هو الشخص المعين لتلقي الشكاوى من المشاركين في الأبحاث.
ستحتاج ان تقتبس H11834.

شكراً لتخصيصكم وقتاً لأخذ هذه الدراسة بعين الإعتبار. اذا كنت ترغب بالمشاركة بهذه الدراسة الرجاء توقيع نموذج الموافقه المرفق.

يمكنكم الإحتفاظ بورقة المعلومات هذه

Appendix Five: Interview Schedule

Appendix 5.1: Interview Schedule - English version

UNIVERSITY OF TASMANIA
School of Accounting and Corporate Governance

Semi Structured Interview Schedule
The adoption of data mining technology within accounting information systems in publicly listed companies in Jordan

Company name: _____
Interviewee's name: _____
Location:_____ Date:_____
Start time of the interview:_____ Finish time: _____

Section One: General Information

1. Your background (work experience, education, roles in company)
2. Your company (department, number of employees under your supervision and your main role relates to accounting information systems).

Section 2: Accounting Information Systems (AIS)

Questions relates to AIS in your company (size, types of system, structure, performance, accuracy, reliability and effectiveness of the systems implementation).

Section 3: Data mining readiness and adoption

Questions relates to your awareness of data mining concept , data mining techniques, data mining software and some questions on how you perceived IT in your everyday activities.

Primary question of this section is whether data mining were installed or adopted in your company. It will then be followed with related questions concerning the adopters and non-adopters.

Questions for non-adopters will mainly ask about the reasons for not having such technology, what other types of analysis being taken to the accounting data, data analysis procedure and their intention to consider data mining software in the future. While for adopters, the questions will mainly ask about the reasons and factors that drove to the adoption and the impact on AIS accuracy, reliability and effectiveness.

Conclusion:
For this part, the questions will mainly focus on your recommendation and feedback about this topic.

Appendix 5.2: Interview Schedule - Arabic version

جامعة تسمانيا

كلية المحاسبة

ملحق المقابلة (نسخة مختصرة)

تبني برامج التنقيب عن البيانات ضمن نظم المعلومات المحاسبية في الشركات العامة المسجلة في الأردن

اسم المؤسسة:_____

اسم الشخص الذي يتم مقابلته:_____

الموقع/ المكان:_____ التاريخ:_____

وقت البداية للمقابلة:_____

وقت الإنتهاء من المقابلة:_____

الجزء الأول: معلومات عامة

1. معلومات عامة عنك : (خبرة العمل، التعليم، الوظائف/ المناصب التي شغلتها في المؤسسة)
2. مؤسستك (القسم، عدد المرؤسين لديك، ودورك الأساسي المتعلق بنظم المعلومات المحاسبية)

الجزء الثاني: نظم المعلومات المحاسبية (AIS)

الأسئلة المتعلقة بنظم المعلومات المحاسبية في مؤسستك (الحجم، أنواع الأنظمة، الهيكل التنظيمي، الأداء، الدقة، المصداقية وفعالية تطبيق الأنظمة).

الجزء الثالث: جاهزية برامج التنقيب عن البيانات والأستعداد لتبنيهم

أسئلة متعلقة بمدى إدراكك لمفهوم التنقيب عن البيانات، وتقنيات التنقيب عن البيانات، والبرامج الحاسوبية الخاصة بالتنقيب عن البيانات، وبعض الأسئلة عن مدى إدراكك لإستخدام تكنولوجيا المعلومات في أنشطة الحياة اليومية.

السؤال الرئيسي في هذا الجزء يتعلق فيما إذا تم اعتماد أو تبني التنقيب عن البيانات في مؤسستك ، ثم سيتبع بأسئلة تتعلق بأولئك الذين يتبنون واولئك الذين لايتبنون برامج التنقيب عن البيانات.

وسوف تركز الأسئلة الخاصة باولئك الذين لايتبنون برامج التنقيب عن البيانات عن الأسباب التي تدعوهم إلى عدم تبني مثل هذه التكنولوجيا، ماهي انواع التحليل الأخرى المستخدمة في بيانات المحاسبة ،وإجراءات تحليل البيانات ومدى توجههم لتبني التنقيب عن البيانات في المستقبل. بينما ستركز الأسئلة الموجهة لأولئك الذين يتبنون التنقيب عن البيانات على العوامل والأسباب التي قادتهم لذلك، وعن مدى تأثير ذلك على دقة ومصداقية وفعالية انظمة المعلومات المحاسبية. (AIS).

الخلاصة: ستركز الأسئلة في هذا الجزء على توصياتك و اقتراحاتك حول هذا الموضوع.

Appendix Six: Frequencies

Statistics

		Experience	Gender	Education	Years as a manager	Employees you supervise	Age
N	Valid	180	180	180	180	180	180
	Missing	0	0	0	0	0	0

Experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 5	38	21.1	21.1	21.1
	5-10	57	31.7	31.7	52.8
	11-15	46	25.6	25.6	78.3
	16-20	26	14.4	14.4	92.8
	More than 20	13	7.2	7.2	100.0
	Total	180	100.0	100.0	

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	male	137	76.1	76.1	76.1
	female	43	23.9	23.9	100.0
	Total	180	100.0	100.0	

Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	high school	3	1.7	1.7	1.7
	college	11	6.1	6.1	7.8
	Bachloar	128	71.1	71.1	78.9
	Master	34	18.9	18.9	97.8
	Doctorate	4	2.2	2.2	100.0
	Total	180	100.0	100.0	

Years as a manager

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 5	114	63.3	63.3	63.3
	5-10	38	21.1	21.1	84.4
	11-15	17	9.4	9.4	93.9
	16-20	9	5.0	5.0	98.9
	more than 20	2	1.1	1.1	100.0
	Total	180	100.0	100.0	

Employees you supervise

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-10	138	76.7	76.7	76.7
	11-20	22	12.2	12.2	88.9
	21-30	5	2.8	2.8	91.7
	31-40	7	3.9	3.9	95.6
	41-50	2	1.1	1.1	96.7
	More than 50	6	3.3	3.3	100.0
	Total	180	100.0	100.0	

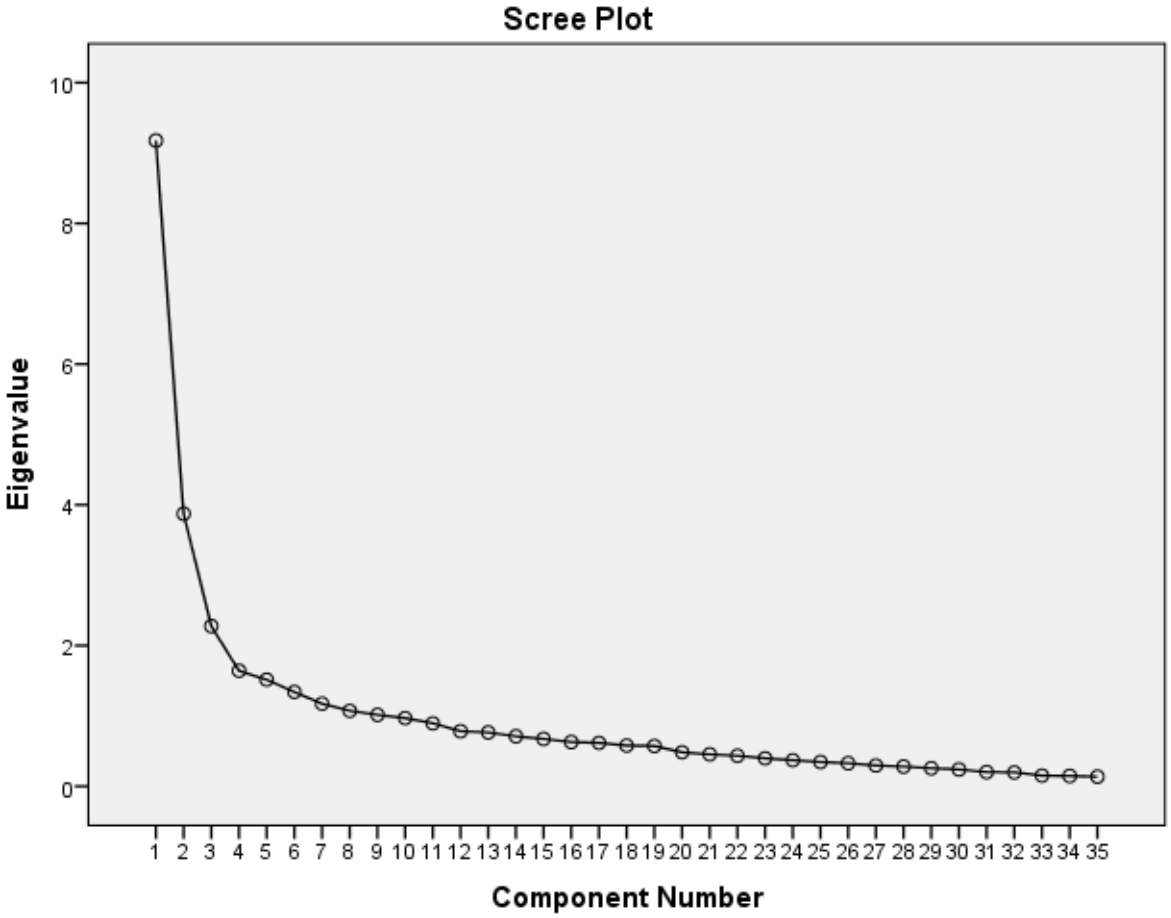
Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than 25	10	5.6	5.6	5.6
	25-29	18	10.0	10.0	15.6
	30-34	45	25.0	25.0	40.6
	35-39	37	20.6	20.6	61.1
	40-44	35	19.4	19.4	80.6
	45-49	19	10.6	10.6	91.1
	50-54	12	6.7	6.7	97.8
	55-59	3	1.7	1.7	99.4
	more than 59	1	.6	.6	100.0
	Total	180	100.0	100.0	

Appendix Seven: Factor Analysis

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Management style 1	180	1	5	3.22	1.021	-.542	.181	-.740	.360
Management style 2	180	1	5	2.68	1.027	.168	.181	-.996	.360
Management style 3	180	1	5	3.47	.918	-.887	.181	.230	.360
Management style 4	180	1	5	3.41	.944	-.571	.181	-.628	.360
Management style 5	180	1	5	4.21	.725	-1.058	.181	2.328	.360
Management style 6	180	1	5	4.29	.744	-1.101	.181	1.933	.360
Management style 7	180	1	5	3.42	.974	-.221	.181	-.770	.360
Management style 8	180	1	5	3.73	.871	-1.187	.181	1.624	.360
Management style 9	180	1	5	3.89	.721	-1.106	.181	2.296	.360
Management style 10	180	1	5	3.95	.734	-1.034	.181	2.133	.360
Management style 11	180	1	5	4.08	.700	-.906	.181	2.326	.360
Management style 12	180	2	5	3.89	.754	-.920	.181	1.120	.360
Management style 13	180	1	5	3.77	.824	-.945	.181	1.692	.360
Management style 14	180	1	5	3.82	.855	-1.100	.181	1.710	.360
Management style 15	180	1	5	3.64	1.017	-.914	.181	.263	.360
Management style 16	180	1	5	3.86	.833	-1.247	.181	2.017	.360
Management style 17	180	1	5	3.37	1.047	-.647	.181	-.172	.360
Management style 18	180	1	5	3.94	.734	-1.278	.181	3.193	.360
Management style 19	180	1	5	3.59	.914	-.777	.181	.279	.360
Management style 20	180	1	5	3.56	.840	-.910	.181	.252	.360
Management style 21	180	1	5	2.81	.962	.311	.181	-.746	.360
Management style 22	180	1	5	3.74	.814	-1.180	.181	1.674	.360
Management style 23	180	1	5	2.59	1.050	.523	.181	-.613	.360
Management style 24	180	1	5	4.08	.858	-1.181	.181	1.977	.360
Management style 25	180	1	5	3.45	.929	-.507	.181	-.404	.360
Management style 26	180	1	5	2.99	.933	.272	.181	-.939	.360
Management style 27	180	1	5	3.62	.841	-.944	.181	.754	.360
Management style 28	180	1	5	3.62	.786	-.602	.181	.286	.360
Management style 29	180	1	5	3.57	.865	-.984	.181	1.158	.360
Management style 30	180	1	5	3.68	.796	-.970	.181	1.390	.360
Management style 31	180	1	5	3.28	.952	-.190	.181	-.769	.360
Management style 32	180	1	5	3.00	1.008	-.099	.181	-.760	.360
Management style 33	180	1	5	3.29	.984	-.621	.181	-.362	.360
Management style 34	180	1	5	2.89	1.008	-.006	.181	-.821	.360
Management style 35	180	1	5	3.94	.738	-1.178	.181	2.906	.360
Valid N (listwise)	180								


Scree Plot
Eigenvalue
10
8
6
4
2
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
Component Number

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	9.178	26.223	26.223	9.178	26.223	26.223
2	3.873	11.066	37.289	3.873	11.066	37.289
3	2.276	6.504	43.793	2.276	6.504	43.793
4	1.641	4.690	48.483	1.641	4.690	48.483
5	1.515	4.328	52.811	1.515	4.328	52.811
6	1.341	3.830	56.641	1.341	3.830	56.641
7	1.173	3.352	59.993	1.173	3.352	59.993
8	1.073	3.065	63.058	1.073	3.065	63.058
9	1.015	2.900	65.957	1.015	2.900	65.957
10	.969	2.769	68.726			
11	.895	2.556	71.282			
12	.783	2.237	73.519			
13	.766	2.187	75.706			
14	.711	2.032	77.738			
15	.673	1.924	79.662			
16	.629	1.796	81.458			
17	.618	1.764	83.222			
18	.579	1.654	84.876			
19	.573	1.637	86.513			
20	.484	1.383	87.896			
21	.454	1.299	89.194			
22	.434	1.240	90.435			
23	.398	1.138	91.573			
24	.370	1.058	92.631			
25	.346	.988	93.618			
26	.328	.936	94.554			
27	.295	.844	95.398			
28	.280	.801	96.199			
29	.256	.733	96.932			
30	.239	.684	97.616			
31	.201	.575	98.191			
32	.198	.565	98.755			
33	.152	.435	99.190			
34	.147	.421	99.611			
35	.136	.389	100.000			

Extraction Method: Principal Component Analysis.

Total Variance Explained items (8,13,31,32 and 33) removed

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.623	28.744	28.744	8.623	28.744	28.744
2	3.708	12.360	41.103	3.708	12.360	41.103
3	1.817	6.057	47.161	1.817	6.057	47.161
4	1.508	5.026	52.186	1.508	5.026	52.186
5	1.273	4.243	56.430	1.273	4.243	56.430
6	1.131	3.771	60.201	1.131	3.771	60.201
7	1.051	3.504	63.706	1.051	3.504	63.706
8	.964	3.213	66.919			
9	.882	2.940	69.858			
10	.843	2.810	72.669			
11	.741	2.470	75.139			
12	.723	2.409	77.548			
13	.669	2.229	79.777			
14	.644	2.147	81.925			
15	.601	2.003	83.928			
16	.527	1.755	85.683			
17	.486	1.622	87.304			
18	.463	1.542	88.847			
19	.436	1.455	90.301			
20	.410	1.368	91.669			
21	.378	1.259	92.929			
22	.339	1.129	94.058			
23	.307	1.023	95.081			
24	.280	.934	96.014			
25	.272	.906	96.920			
26	.241	.802	97.722			
27	.214	.714	98.436			
28	.166	.554	98.990			
29	.155	.516	99.507			
30	.148	.493	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a,]

	Component								
	1	2	3	4	5	6	7	8	9
Management style 1	.458	-.234	-.074	.515	.066	.145	.056	.135	-.036
Management style 2	-.090	.436	-.006	.376	-.173	-.069	.157	.339	.355
Management style 3	.554	-.345	-.144	.120	.158	.212	-.343	.184	-.238
Management style 4	.221	.467	-.355	.076	-.191	.230	-.289	.372	-.262
Management style 5	.700	.046	.038	-.116	-.377	.102	.120	-.038	-.087
Management style 6	.733	.032	-.174	-.232	-.269	-.039	.210	.005	-.133
Management style 7	.489	.050	.199	-.166	.374	-.010	.274	.079	-.219
Management style 8	.368	.285	-.129	-.148	.435	-.389	-.064	.363	-.081
Management style 9	.508	.288	-.119	.030	.201	-.477	.009	-.066	.094
Management style 10	.652	.165	.002	-.378	-.036	.035	.043	-.090	.047
Management style 11	.759	.051	-.131	-.133	-.341	.012	.094	-.153	.205
Management style 12	.702	-.010	-.142	-.262	-.061	.107	-.008	-.095	.168
Management style 13	.331	.376	-.402	.098	.190	-.181	.240	.127	-.314
Management style 14	.567	-.159	-.416	.325	.101	.066	-.014	-.187	-.001
Management style 15	.649	-.354	-.182	-.008	.117	.153	-.185	-.028	.024
Management style 16	.724	-.305	-.246	.087	.087	.001	-.058	-.101	.030
Management style 17	.414	-.234	-.256	.327	.349	.295	.078	-.287	.082
Management style 18	.779	.118	-.127	-.018	-.128	.028	.064	.007	.039
Management style 19	.239	.504	-.253	-.056	.053	.154	.008	-.074	.304
Management style 20	.677	-.093	.254	.048	.052	-.048	-.148	.269	.181
Management style 21	-.280	.657	-.042	-.106	.099	.353	.066	.011	-.010
Management style 22	.701	-.041	.114	-.064	-.053	-.090	-.237	.228	.260
Management style 23	-.285	.678	.032	.010	.112	.146	-.068	.037	.127
Management style 24	.731	-.122	.066	-.052	-.203	-.030	.284	.114	-.107
Management style 25	.092	.530	-.108	.058	.226	-.281	.199	-.237	.059
Management style 26	.263	.451	.227	-.214	.233	.082	-.421	-.307	-.060
Management style 27	.139	.631	-.213	.082	.046	.060	-.260	-.152	.036
Management style 28	.403	.375	.286	.179	-.081	.049	.084	-.123	-.365
Management style 29	.414	.264	.505	.425	-.209	-.170	-.162	-.089	-.046
Management style 30	.499	.230	.474	.367	-.199	-.216	-.194	-.163	-.080
Management style 31	.396	-.037	.557	-.014	.253	.161	.201	-.102	-.123
Management style 32	.320	-.061	.485	-.341	.222	.228	-.086	.187	.059
Management style 33	.363	-.010	.318	.261	.314	.258	.296	.131	.302
Management style 34	-.065	.555	.048	.059	-.165	.409	.176	.089	-.099
Management style 35	.722	.092	.081	-.151	-.031	-.070	-.041	.021	.061

Extraction Method: Principal Component Analysis.

a. 9 components extracted.

Component Matrix, items (8,13,31,32 and 33) removed

Component Matrix[a]

	Component						
	1	2	3	4	5	6	7
Management style 1	.466	-.223	-.025	.518	-.142	-.008	.194
Management style 2	-.100	.434	-.082	.279	-.343	-.350	-.117
Management style 3	.567	-.341	.111	.272	.036	.428	-.012
Management style 4	.222	.449	.330	.186	-.422	.289	-.159
Management style 5	.710	.097	-.050	-.216	-.300	.006	.069
Management style 6	.744	.047	.106	-.301	-.195	-.093	.183
Management style 7	.461	.057	-.082	-.109	.337	.099	.511
Management style 9	.492	.263	-.007	.056	.305	-.407	-.072
Management style 10	.650	.196	.096	-.379	.122	.096	.072
Management style 11	.779	.094	.092	-.207	-.174	-.191	.001
Management style 12	.707	.014	.213	-.237	.031	.005	-.065
Management style 14	.586	-.171	.329	.414	.012	-.166	.006
Management style 15	.664	-.337	.214	.107	.076	.140	-.052
Management style 16	.739	-.301	.192	.144	.062	-.054	-.034
Management style 17	.420	-.240	.300	.436	.227	.035	.258
Management style 18	.781	.143	.117	-.031	-.125	-.114	-.056
Management style 19	.230	.496	.351	.032	.044	-.083	-.080
Management style 20	.667	-.054	-.266	.032	.045	.121	-.130
Management style 21	-.304	.652	.263	.003	-.002	.170	.277
Management style 22	.702	-.003	-.150	-.056	.028	.057	-.262
Management style 23	-.314	.668	.096	.094	.078	.070	.128
Management style 24	.733	-.093	-.127	-.170	-.216	-.091	.182
Management style 25	.072	.507	.091	.063	.337	-.396	.190
Management style 26	.241	.482	-.047	-.074	.480	.363	-.264
Management style 27	.127	.623	.263	.187	.080	-.025	-.351
Management style 28	.403	.376	-.295	.072	-.076	.157	-.040
Management style 29	.406	.331	-.654	.295	-.021	.010	.094
Management style 30	.491	.293	-.629	.236	.036	.013	.001
Management style 34	-.079	.574	.071	.007	-.275	.257	.343
Management style 35	.717	.125	-.064	-.167	.085	.024	-.108

Extraction Method: Principal Component Analysis.

a. 7 components extracted.

Appendix Eight: Correlations between demographic characteristics and attitudes toward DM

Correlations

		Attitude toward DM	Age	Experience	Gender	Education	Years as a manager	Employees you supervise
Pearson Correlation	Attitude toward DM	1.000	.007	-.069	.029	.060	-.050	.027
	Age	.007	1.000	.758	-.083	.198	.493	.417
	Experience	-.069	.758	1.000	-.140	.214	.457	.370
	Gender	.029	-.083	-.140	1.000	-.125	-.008	.082
	Education	.060	.198	.214	-.125	1.000	.271	.374
	Years as a manager	-.050	.493	.457	-.008	.271	1.000	.671
	Employees you supervise	.027	.417	.370	.082	.374	.671	1.000
Sig. (1-tailed)	Attitude toward DM	.	.461	.178	.351	.213	.251	.362
	Age	.461	.	.000	.134	.004	.000	.000
	Experience	.178	.000	.	.031	.002	.000	.000
	Gender	.351	.134	.031	.	.047	.458	.138
	Education	.213	.004	.002	.047	.	.000	.000
	Years as a manager	.251	.000	.000	.458	.000	.	.000
	Employees you supervise	.362	.000	.000	.138	.000	.000	.
N	Attitude toward DM	180	180	180	180	180	180	180
	Age	180	180	180	180	180	180	180
	Experience	180	180	180	180	180	180	180
	Gender	180	180	180	180	180	180	180
	Education	180	180	180	180	180	180	180
	Years as a manager	180	180	180	180	180	180	180
	Employees you supervise	180	180	180	180	180	180	180